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P-6E's in Formation
Above the Clouds
Official U. S. Army Photo

NRA MEMBER U.S. WE DO OUR PART

Southwestern AVIATION

20

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George E. Haddaway - - - - - - - - - *Editor*
A. T. Barrett, Jr. - - - - - *General Manager*

Associate Editors

P. T. Norton, Jr.
Marlin S. McGrady
George Carroll
W. A. Hotmann, Jr.

Sam W. Taylor - - - - - - - - - *Art Editor*

Washington Bureau: Suite 603, 2025 Eye Street N. W., Washington, D. C.

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Editorials and Comments

A National Policy

When the President returned recently from his much needed rest, he asked Congress to hasten temporary legislation in order that the air mail might be returned to commercial aviation, and that he be empowered to appoint a commission for the study of our national aviation system in order that recommendations for legislation might be made to the next Congress. "It must be borne in mind that the U. S. has had no broad aviation policy," he said.

The delay of carrying out the President's wishes is discouraging to the entire industry. Those who believed the sweeping investigations and subsequent changes would result in a definite, stimulating, governmental policy for aviation, are exhibiting impatience. The entire industry suffers from the delay.

If the will of the majority were carried out, Congress would act with expediency. It is hoped that the present indications do not point to a long drawn-out legislative football game between the House and the Senate. Turn the air mail back to commercial aviation —to those who are equipped to handle the job, and at the same time lay the foundation for a broad aviation policy requested by the President and desired by the people.

Foster Industrial Development

Too much cotton, too much oil, too much steel, too much wheat. The superabundance of goods and products along with the breakdown of the distribution machinery presents a problem that stumps our economic wizards.

In aviation the facts are reversed; but the problem is just as mystifying. As of April 1, 1934 there were 13,489 Americans licensed by the Department of Commerce to pilot aircraft. As of the same date there were only 8,856 licensed and unlicensed aircraft to be piloted. The discrepancy is even more alarming when we consider the hundreds who have let their licenses lapse, and the uncounted thousands who clamor to enjoy the arts of the air. There are not too many airplanes.

The balancing of the "aviation budget" is inevitable, and the present indications attest to the fact that the time is not far in the future.

With this in mind it is not difficult to see the opportunity that presents itself to the Southwest, namely, the potentiality of the Southwest in becoming an industrial aviation region, not only in the manufacture and distribution of aircraft, but in the manufacture and distribution of all the associated products in aeronautics.

Many forces operate against industrial development within our borders, and are not plainly evident upon a superficial consideration. High up in the ranks of these retarding factors is our friend the banker, who, in his dealings and transactions, merely reflects the public sentiment even as a political representative of the people. Unfortunately this public sentiment is prone to cast the grim shadow of suspicion over anything indicative of industrial enterprise. Crop loans, cattle loans, property loans are easily consummated. Capital loans for industrial development are met with obdurate resistance.

Industry will enter and build where the congenial factors necessary to industry's growth and expansion exist. The wealthy Southwestern markets, the Southwest's geographical location, its untouched natural resources, its transportation facilities in air, on land and water, its distinct climatic superiority—the congenial factors are present—all save one: *A definite will of the people to foster industrial enterprise.*

The economic curve is climbing slowly towards normalcy. Purchasing power is rising proportionately. Now is the time to plant the seeds of industrialization in the Southwest, so that when the era comes, we shall not be on the outside looking in.

Nations to the South

Many of us in the United States have finally come to realize that our foreign trade must not depend wholly upon Europe's acceptance of our products. Her torn and crippled credit structure and her political chicanery are not congenial to healthy trade relationships. We have been deluded and ham-strung long enough by the several European States, and have neglected too long our neighbor nations to the South.

We are gradually growing wiser. We are beginning to realize that in our own Western Hemisphere are markets far more potential and attractive: Mexico, Central America, and the South American republics. Of late a growing feeling of good will between the United States and the Pan-American republics has been in the wind. The attitude of the Department of State under the able leadership of Cordell Hull makes for friendly relationships between the United States and the neighbor nations.

Unhearalded and unsung, but definitely augmenting Cordell Hull's "policy of the good neighbor" is the flying and ground personnel of Pan American Airways. This personnel of the great air network is constantly on the job, day and night, giving service, forming friendships, bringing the North American in closer contact and mutual understanding with his Latin American brother. The net result can be translated as being much more than mere good business.

Figures of travel recently issued by the State Department show a thirty per cent drop in American travel to Europe, and a corresponding *advance* in travel to the nations to the South. Even the American tourist is growing wiser according to these figures. The fascination of the Latin American republics coupled with the service of the largest air transport system in the world may be read between the lines of the State Department report.

LEFT TO RIGHT Brig. Gen. C. H. Danforth, Commanding Officer, Air Corps Training Center, Lt. Col. Clark, Randolph Field. Major William Ocker, Blind Flight Instructor, Kelly Field. Subject in foreground is under the hooded mask, ready for a spin in the swivel chair.

U. S. Army Photo—20th Photo Section.

Under The Hood

BY MAJOR WILLIAM C. OCKER, A. C.

The world's foremost pioneer and present-day authority on blind flying, co-author with First Lt. Carl J. Crane of "Blind Flight in Theory and Practice," which is internationally studied and recognized as the best authoritative analysis of instrument flying.

BY BLIND FLIGHT is meant flying without a natural horizon for guidance, such as occurs in fogs and thick weather. The object of the apparatus (the hooded airplane) for instructing airplane pilots in the art of blind flying is to enable the pilot to be trained to fly by, and to place absolute reliance in, the artificial horizon established by his flying instruments—even though such instruments read contrary to the pilot's own physical sensations.

The apparatus permits the practical application, under actual flying conditions, of the ideas and principles embodied in the training device; consisting of a turning chair and a light-proof box containing a turn indicator, flashlight, and compass.

This is the device by which it was first successfully and forcibly demonstrated—contrary to the then accepted theory of flight instruction—that dependence by a pilot, without a natural horizon, on his senses rather than his flight instruments would only lead him into dangerous maneuvers.

No Trust in the Senses

The inaccuracy of the senses in determining direction can be demonstrated. This is done by placing the subject in a swivel chair and turning the chair rapidly in either direction. When the movement of the chair is slowed the subject of the experiment has the sensation of being stopped, then as the rate of rotation continues to diminish the subject has the sensation of being turned in the opposite direction. The experiment is repeated with the subject watching a blind flying instrument equipped with a bank and turn indicator. He notes that the instrument shows he was turning to the right, although he has the sensation of turning to the left.

The same condition occurs in an airplane. In a training airplane for use in blind flying instruction, the student pilot's compartment is furnished with a set of flying instruments providing an artificial horizon, with a removable covering which can be arranged so the student pilot is required to fly by instruments alone.

As a result of earlier training methods, most pilots feel that flying sense is largely one of muscular balance and that visual reference played a more or less insignificant part. The aviator laid great stress on this special sense, the "feel of the ship." The aviator feels that he must fly by the feel of the "seat of his pants." It was usually considered the most important attainment gained from experience, hence flying by instruments was frowned upon by most of the early aviators —with two conspicuous exceptions: Wilbur and Orville Wright.

I have had many discussions with Orville Wright on this subject and I believe that if the inventor of

the airplane found it necessary to use instruments, it is a subject worthy of study. As early as 1920 I discussed it with Major Reinartz, who encouraged me considerably.

During war times—and at present with commercial aviation—it is not always possible to choose ideal weather.

An untrained aviator flying in fog is sure to ignore the instruments, and control the airplane in response to his own sense of feel—on the generally accepted theory that one's own sense of equilibrium and orientation can always be depended on to furnish information as to the attitude of the plane in the air.

The Great God Weather

The fact that flying in bad weather is unsafe has been emphasized by crashes. That one's own senses are far from infallible in maintaining equilibrium of the plane is also evidenced by the fact that many experienced pilots have come out of fog to find themselves with the wing down, or even in an inverted flying position. A very large portion of crashes during blind flight is due to the power spiral dive or tail spin. This conclusion is based upon observations and experiments.

In piloting the course of a blind flyer it has been found without exception that no such pilot maintained a straight and level course for any appreciable length of time but soon banked the plane into a spiral dive. Our senses regarding attitude and motion are false. A pilot can never trust his sensations unless he has a horizon by which to check them.

If a pilot flies in a fog and maneuvers into a spiral dive or spin and comes out, he has the sensation of spinning in the opposite direction of the supposed spin. This correction puts him in another spin, and this may continue in a vicious circle until he crashes. His only hope is to disregard his sensations and fly by his instruments. Failure to make proper use of the instruments is due to lack of confidence in flying instruments, ignorance of the fact that they furnish an artificial horizon, and ignorance of the fact that the pilot's sense of feel is a liar—also the element of fear, which Major Reinartz has often discussed.

Confidence in the Instruments

Without special training it is impossible to follow one's instruments, even after a demonstration of the absolute unreliability of one's sense of direction and movement. That is because the erroneous sensations received are overpowering until one has been trained to disregard them. In this connection it is interesting to note that trained flyers were found unable to fly blind, by instruments, without re-education; even though they realized its necessity. They had been flying too long by "feel" to be able to suddenly disregard their sensations. The problem therefore is to educate the pilot to believe in the instruments and to become expert in using them, by continuous practice.

The first stage of training is to convince the pilot that his sense reactions under certain conditions are 100% wrong and the flight instrument indications are right. It has required ten years for flyers in general to admit that fact. And it is necessary to very forcibly impress this fact on each student before the second stage in his instruction in blind flying.

Following this, the training is carried on in a hooded airplane under the guidance of a safety pilot.

Until pilots have been instructed in the use of instruments and are trained to ignore their own reflexes, blind flying without a safety pilot will always be a dangerous practice. The conflict between the pilot's own sensations and the indications of his instruments is very definite, and to be master of his sensations the pilot must never cease his practice under a covered cockpit or in fog.

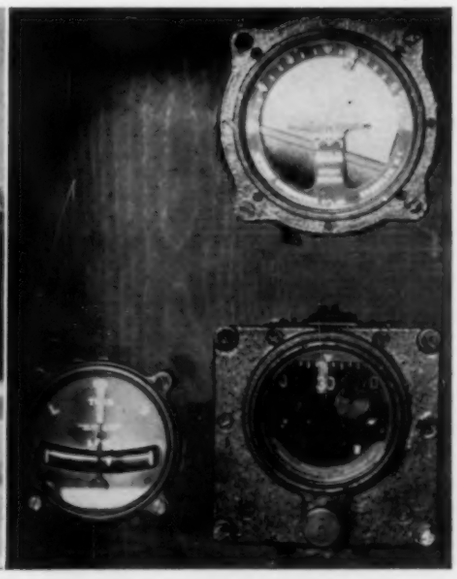
Get Under the Hood Early

Blind flight training should be started during the early stage instead of the last stage of the pilot's training. The training of pilots should be started in a plane with the hooded cockpit. As a member of the

Instrument Box Test

(Left) After the "Spin" the subject looks into box containing the fundamental instruments.

Shown at Right: "Result of Test" The senses are wrong. The Instruments are correct.



Research Council of the Hancock Foundation College at Santa Maria, California, I suggested research along this line and it was found that a pilot trained in this manner was less apprehensive when caught in bad weather than one instructed in the usual manner. This research should be continued.

The turning chair and instrument box is in use here in the Army Air Corps Training Center, officially, by order of Brigadier General Charles H. Danforth. It is hoped that the Department of Commerce will make use of this device, for the cost is nil and the benefits are manifold.

A formation of three pursuit machines was flown in fog by Captain Cannon of San Antonio, Director of Training at the Air Corps Training Center. That was two years ago and, in my belief, it is the first time a formation has been deliberately flown through fog. The leader flew by his instruments and the wing men flew close and used the leader as their artificial horizon.

It is well for us to remember that the Wrights were right regarding the use of flight instruments more than twenty-five years ago, as they were also pioneers in so many other phases of aeronautics.

We quote the story of George E. Hansen, Second Lieutenant, A. C., which conspicuously exemplifies the need of blind flight training as late as December 12, 1927:

One Pilot's Experience

I entered the Air Corps Primary Flying School at Brooks Field, San Antonio, Texas, with the class of November 1, 1927.

On the morning of December 12, 1927 I took off solo in a PT-1. In the south and east the sky was dark and we were instructed to remain in the vicinity of the field. I was flying about 2 miles north of the field. The ceiling was about 2,000 feet. I had heard much about the difficulty and, I might say, the mystery of flying in the fog so I ventured up into the clouds for a few seconds at a time to see what it was like.

Suddenly I saw a dense tulle fog come rolling in from the South. I nosed down and headed back toward the field but was overtaken by it just before reaching there. Probably had I had more flying experience I would have glided on down and hedge-hopped on in, but with the bliss (?) of ignorance of fog flying I turned back North when at 150 feet I could not see the ground, thinking I could outrun or climb above the fog. My fear then was of gliding into the ground or of crashing into the water tower at the field rather than of flying blind for any length of time.

I climbed for about ten minutes but rather than get above it or into the clear the clouds got denser. It was then raining and it was difficult to see the motor instruments up on the wing. At an altitude of 4,000 feet it seemed that all of a sudden I completely lost my sense of balance and I didn't know whether I was on one side or the other, going up or down, or bottom side up. I probably pulled the ship up into a stall for my next sensation was that of spinning to the right.

Hooded Cockpit on a B.T. Training Ship in use at Kelly Field

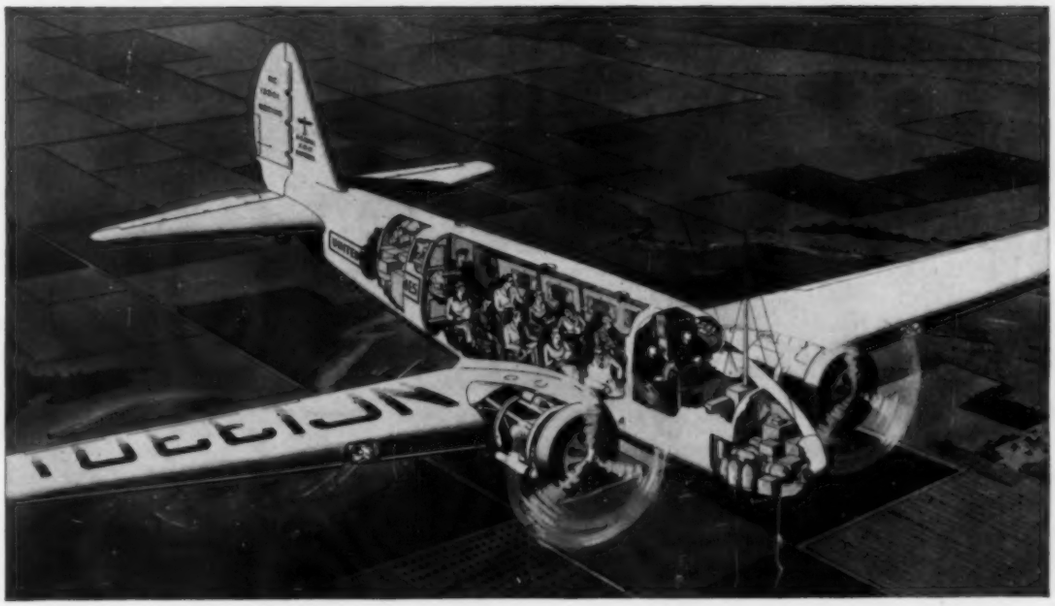
I attempted to bring it out but at no time could I bring it back to where it felt like I knew what position I was in, except that for a moment it seemed I had stopped spinning to the right. Shortly afterwards, however, it seemed the plane was again spinning to the right.

I could not see the altimeter clearly but noted then that it read about 500 feet. Of one thing I was certain, and that was that I had lost too much altitude too soon. I could not see the ground so decided the safest thing to do was to jump. I cut the motor and mechanically applied left control to bring the ship out of the right spin I though I was in. When I tried to rise up and jump over the side I found that I was literally "glued" in. With my hands on the sides of the cockpit I raised myself from the seat, got both feet up on the cowling and pushed myself overboard the right side of the ship. I fell head first and as soon as I fell clear of the ship, pulled my rip cord. I saw the 'chute trail out and felt it pop open but I do not remember hitting the ground. It seemed only a few seconds later I was lying on the ground afraid to try to move for fear I had some broken bones, but luckily I was unhurt. The plane fell in the only vacant block in the neighborhood in the center of Highland Park residence district, about 100 yards from where I landed. The plane had evidently come out of the spin (if it was in one) for it cut a swath through the mesquite for about 20 feet before it stopped, a 100% washout.

I talked with two men who witnessed the jump and crash. They were attracted by the noise of plane which, they said, they could not see but knew was close. They estimated the height at which they first saw the plane to be about 200 feet. They said the plane was in a spiral to the left, and that I was falling from the ship with the 'chute not yet open; that the 'chute popped open just as it seemed inevitable that there was going to be one less cadet. Both men stated that I struck the ground on the down swing of the first oscillation. (Just how reliable their statements are I do not say; I've related them as related to me).

Fog flying was more of a mystery to me now than before. I thought I was deficient in the physical make-up of an aviator and that, for sure, that occurence, would demonstrate to the flight surgeon that I was no longer needed at Brooks Field. After given a physical examination to determine if I had received any injuries, and the making of various reports, I was given another PT-1 to solo; but it was several days

(Continued on Page 28)



Cut-away Drawing Showing Express Compartments in a Modern Air-Liner. Shoes, Gardenias, Machinery, Are All a Part of the Wide Variety of Shipments.

Wings For Commerce

BY RUSSELL LeBROCK*

An Expert Answers Pertinent Questions on Air Express

One of the newest phases of modern air transportation though it may be, air express has nevertheless developed so rapidly during the past few years that today it stands firmly established as an important and highly useful factor in the national system of transportation and distribution services.

Proof positive that this particular branch of scheduled air transport operations has grown to truly substantial proportions may be found in the express compartments of any modern air liner operating on regular schedule, for an increasingly large quantity of packages which require speedy transmittal are being shipped "via air express".

This branch of commercial aviation had its beginnings in the United States in 1926, when 6,467 pounds of express were transported on scheduled planes. The following year development of a co-ordinated air express system on a nation-wide basis was begun with the affiliation of United Air Lines and other companies with the Air Express Division of the Railway Express Agency, the latter organization serving as the ground pick-up and delivery agent. That year, volume of air express increased to 12,495 pounds, still a relatively inconsequential amount. However, by 1930 the air express traffic totalled 286,798 pounds, and in 1932, 1,324,428 pounds were carried. Last year the total volume of express transported by planes in the United States reached 1,660,000 pounds.

Checking over recent air express manifests on United Air Lines' New York-Chicago-Kansas City-Tulsa-Oklahoma City-Fort Worth-Dallas and New York-Pacific coast passenger-express routes, we find the following commodities, selected at random from the increasingly wide variety of shipments being routed regularly via air express:

Advertising material, electrotypes, automobile parts and accessories, books, castings and molds, cosmetics, drugs, flowers, hardware, jewelry, machinery, foodstuffs and serums.

The express traffic department of United Air Lines has received many inquiries about air express, and a few typical questions and answers will serve effectively to picture the present status of this phase of aviation.

WHAT CAN BE SENT AIR EXPRESS?—Practically every type of material or product; in fact, almost anything that can be shipped by surface transportation except inflammables, explosives and live stock. Packages weighing up to 200 pounds are carried regularly, and larger and heavier shipments by special arrangement.

WHERE CAN AIR EXPRESS BE SENT?—To and from any place in the United States. In the case of United Air Lines, packages are delivered to airport centers by Railway Express Agency and picked up by the same speedy air liners that transport passengers. Although principal cities of the country are served directly by air lines, the arrangement with the Railway Express Agency permits air-rail schedules to every city in the nation. Express is transported by

*Express Traffic Manager, United Air Lines.

air to the nearest air terminal, and then conveyed on to the point of destination by fast train.

ARE PACKAGES INSURED?—Air express rates include $50.00 liability for 100 pounds or less. Over 100 punds, a charge of 15 cents per $100.00 is applied.

HOW MUCH DOES IT COST TO SEND A PACKAGE AIR EXPRESS?—Rates are economical, being only one-third the tariffs that prevailed three years ago. Following are a few examples of the rates and speed of modern air express service. The rates apply on 5-pound packages, and, of course, vary according to different weights:

Los Angeles to New York, 21¼ hours, $5.50; Chicago to Philadelphia or New York, 5 hours, $2.14; Dallas and Fort Worth to Chicago, 6¾ hours, $2.54; Kansas City to New York, 8¼ hours, $3.04; Los Angeles to Seattle, 8½ hours, $2.84.

Referring back to the material increases recorded annually in the volume of air express, it is interesting to note some of the factors which have contributed to this rapid growth. Perhaps the two most important single reasons why express has grown to its present large volume are the great increases in speed and frequency of air service recorded in this country during the past year or so, and the radical reductions which have been made in air express rates. Still another significant consideration is the expansion of express facilities to serve the entire continent. The original air express set-up with United Air Lines, National Parks Airways, Western Air Express, Northwest Airways and other companies in affiliation with the Railway Express Agency was expanded from its inception when it served a network of around 6,000 miles, to a present route mileage of nearly double the original organization. In addition, service to scores of cities not situated on this network was established through the organization of General Air Express.

A further cause, as well as an effect, of air express expansion is the development of new methods of transacting business. The speed of air express service fits well into the modern merchandising picture of small stocks and quick turnovers, and is likewise invaluable to merchandisers who find improved trade, resulting from progress toward normal economic conditions, causing heavier demands than can be filled from stock on hand. Replenishments via air express solves this business problem.

A buyer of a department store may purchase two dozen dresses and find that they did not sell as fast as he thought they would, or he might find himself with half of them left on his racks. Thus his expected profit, and more besides is tied up in inventory. Contrast this with the position in which the modern retailer may put himself. By employing the speed of air express, he is able to buy in smaller quantities, say three or six dresses. If they go "like hot cakes," he can immediately wire for more and have them for the opening of his store the next day. Thus he can maintain a low inventory.

For example, a leading Chicago department store relies heavily upon air express, although the volume of business handled by this establishment is truly huge. But overnight delivery between New York and Chicago, with goods being assembled after business hours for transportation on a United Air Lines plane leaving New York after business hours and reaching Chicago in time for delivery before opening of the store in the morning, offers a type of service really valuable to this large store. Recently, this store had 2,400 pounds of new dresses shipped via air express from New York.

An Omaha department store executive flies as a passenger to New York, does his buying and ships a substantial part of his purchases by air express, and advertises that fact with successful merchandising results. The latest Paris creations arrive in California six days after leaving France: five days by steamer and less than one day by air express from New York.

Banks are, of course, extremely large users of air express service. One bank saved $1,700 interest on a single air express shipment. Cancelled checks are flown as air express 2,000 miles overnight so that they may be cleared without loss of interest to the dispatching bank when the clearing houses in Chicago, New York and other points, open the following day.

An official of the Florists Telegraph Delivery Association, states: "Flowers are a perishable product calling for quick transportation and careful handling, and air express is more or less an answer to the florist's prayer. Customers will no longer take the answer from a florist that such and such a flower is out of season in a particular territory."

That his statement is borne out in actual practice is attested by the steadily growing volume of flowers being shipped regular on planes of United Air Lines. Gardenias, daffodils, jonquils, lilies, and other Spring flowers were shipped from the Pacific coast in quantities totalling literally tons to satisfy the eastern demand for outdoor-grown Easter flowers.

Almost every industry is represented in the air express shipments carried on established commercial air lines today, and the future of this phase of air transportation is indeed a bright one.

Loading Air Express: 1,600,000 Pounds Transported Last Year.

Inspection of Aircraft

By REAGAN C. STUNKEL

Inspector, Bowen Air Lines

Author's note: It is not the object of this series to qualify a person as an inspector of aircraft by presenting a routine to follow. Nothing can supplant experience as an inspector. A thorough study of the routine presented here will, however, give one a concise method by which an intelligent inspection may be made. The object of the inspection is, of course, to discover troubles and defects before they develop seriously. This article is the resume of notes made by the author over a period of four years, engaged in the inspection of aircraft of all descriptions.

+ + +

PART 1.

The Engine and Its Installation

In the inspection of an airplane engine and its installation, the use of an inspection form listing the various components is strongly advised. This form is required by all airlines, and a similar form is found in most of the log books in private aircraft. In either case, a definite record of the inspection and the corrections made to the aircraft is indispensable.

The Motor Mount

The first operation in the inspection of an engine and its installation, is to have whole assembly cleaned. The necessity for having each part scrupulously clean can not be overemphasized, since the whole object of the inspection is defeated if any portion of the power plant is missed or overlooked. After the cleaning operation it is well to begin the inspection with the motor mount. Minute inspection of the motor mount members is necessary, since a very small crack can develop quickly enough in this assembly and may become a major fracture before the next inspection. Steel tubing mounts have a habit of breaking at the very edge of welds in such a manner that they are very difficult to find. A small magnifying glass is an indispensable part of an inspector's equipment. Cracks about which the inspector is doubtful even after observation with the glass, can be discerned by the application of a coat of iodine to the part in question. The crack, if there be one, will be instantly apparent. Some small ships are equipped with wooden mounts. These should be inspected for separation of laminations, oil soaked conditions or portions of the mount where the wood has become too far compressed by the tension on the mount bolts to be safe.

Next, it is well to check the mount bolts and nuts for tightness. This can be done without removing the cotter pins by placing a wrench on the nut and applying a force gently to the nut. Any looseness can be determined by the ease of movement of the nut through the distance allowed by the space between the castellation and the cotter pin. The point of attachment of the mount to the major structure should next be inspected. Some installations are welded directly to the main structure, while others utilize rubber shock units, taper pins, or bolts. In any instance, the inspector must be certain that the mount is securely attached to the main structure without the prevalence of worn or broken parts. It is often well to lift the engine by means of a hoist, observing the action of the fittings

ENGINE INSPECTION

	L.	C.	R.		L.	C.	R.
ENGINE MOUNT		✓		LUBRICATING SYSTEM		✓	
ENGINE MOUNT ATTACH.		✓		OIL TANKS		✓	
COWLING		✓		OIL LINES		✓	
COOLING SYSTEM		✓		STRAINERS		✓	
SHUTTERS		NO		ENGINE CONTROLS		✓	
RADIATOR		NO		THROTTLES		✓	
CONTROLS		NO		SPARK		✓	
WATER CONNECTIONS		NO		ALTITUDE		✓	
FUEL SYSTEM		✓		HEATER		✓	
GASOLINE TANKS		✓		ENGINE GREASED & OILED		✓	
GASOLINE LINES		✓		EXHAUST MANIFOLD		✓	
STRAINERS		✓		CONNECTIONS		✓	
CARBURETORS		✓		BATTERY		✓	
GASOLINE GAUGES		✓		IGNITION SYSTEM		✓	
FUEL VALVES		✓		WIRING		✓	
"CHECK PUSH ROD HOUSING"		✓		SWITCHES		✓	
FOR WATER (WASP & HORNET)		NA		PROPELLERS			

(COURTESY AMERICAN AIRWAYS, INC.)

BOWEN AIR LINES, INC.

Ship No. _____

30 Hour Motor Check. Date____ Motor No. _____

All items must be marked O. K. by mechanic in charge of inspection and signed by him. Shop Foreman must sign before ship is released.

Engine-
- Clean Lukenheimer
- Check Valves.
- Grease pushrods.
- Grease rockers.
- Clean oil screen.
- Drain sump.
- Remove spark plugs and check.
- Clean gas screens (Check two for Orions)
- Clean carburetor screens and wells. Check all gas lines and rubber.
- Check throttle for operation and looseness in pins.
- Check economizer levers for operation. Check bypass springs.
- Check exhaust nuts for tightness.
- Check intake pipes.
- Check startor and switch wiring.
- Check exhaust stacks for cracks.
- Check motor mount bolts and fittings.
- Check magnetos.
- Check baffles.
- Check prop and safety.
- Wash motor.
- Run motor - Speed idling
  R.P.M. Open
  R. P.M. Left mag.
  R. P.M. Right mag.

Remarks.

_____

SIGNED: SIGNED:

_____ _____ _____

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Two Representative Engine Inspection Sheets, That Are Necessary for Complete Inspection Service.

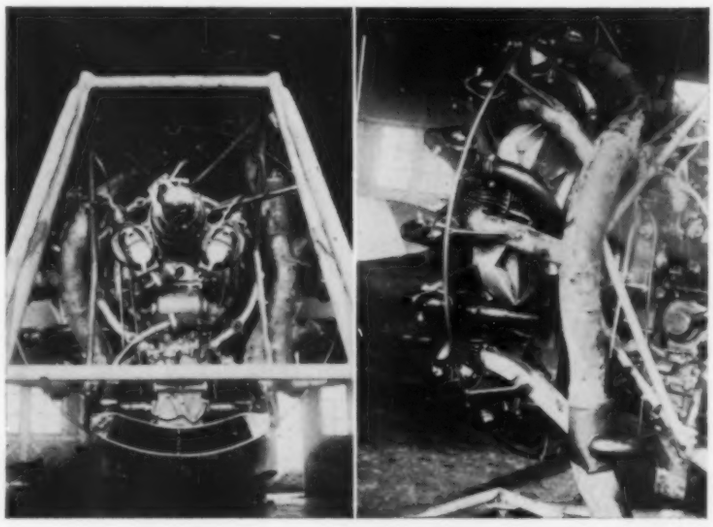
at the fuselage or nacelle to determine the actual condition of this attachment. Oil-soaked or worn rubber shock pads should be replaced. On one type of plane with which the author is familiar, the engine mount is simply the extension of the dural monocoque fuselage, with holes cut in the side to facilitate working on the engine. Dural structure should be closely inspected for evidence of distortion, cracking or corrosion. Rivets that become loose should be replaced. On one type of commercial transport now in use, the center motor mount attachment displayed a weakness at the lower attachment fittings. These fittings would break in spite of the replacement of new parts. The difficulty was finally eliminated by the use of a reinforced fitting. Repeated occurrence of a failure in a member may be due to the installation of the part in a strain. When a fracture is discovered in a motor mount part, the inspector should ascertain, if possible, the exact cause of the failure, as it may be possible to eliminate such failures in the future.

Oil and Fuel Lines

In most of the latest aircraft, the oil and fuel plumbing has been greatly simplified. There are still some systems in use, however, that are quite complicated. A thorough knowledge of the functioning of any system is necessary for an intelligent inspection. Fuel and oil lines in very compact installations are usually in such close proximity to each other and to the other parts of the ship that a close inspection is difficult. These lines should be examined for possibilities of wear due to friction against other parts of the ship or other lines. Places in gas or oil lines that are buckled or kinked warrant the replacement of the part. Lines that are flanged on the ends and secured in a fitting by a nut screwed against the flange, should be felt to determine the condition of the flange. Continuous removal and replacement of a line connected in this manner weakens the flange, therefore it is wise to replace lines that must be loosened for engine replacement, after two or three motor changes. Condition of gas and oil hose are, of course, very important. After becoming old and very soft, oil hose is likely to crimp under the hose clamp and leak. Gas hose that has become old and cracked on the outside should be replaced. In systems where the gasoline is drawn from below the carburetor float level and pumped to the carburetor by an engine pump, the condition of the hose connections and fittings assume a great importance. It does not take a very large air leak in the suction line to the fuel pump to cause a drop in fuel pressure. It is good to disconnect the gas line at the carburetor hose connection and check the flow of gas from the gravity tanks of the ship, and at the same time to check the operation of the shut-off valves. In ships where the oil tank is integral with the installation, supports holding the tank should be examined to see that the tank is properly insulated against friction, or cracking due to vibration. Inspection for leaks may be made when the motor is run. The bypass and relief valve assembly in systems depending on an engine pump is usually the source of trouble when drop in fuel pressure is involved. This trouble may be partly averted if the springs in these assemblies are checked for wear or breakage periodically. The light spring wears against the guide that holds it in place, causing a consequent loss of pressure. Condition of carburetor bowl drains, fuel pump gland drains, and fire extinguisher pressure lines should be determined.

Engine Controls

Engine controls, unless they are kept in good condition, are the source of a lot of inconvenience. Newer models of aircraft utilize ball bearings and replaceable bushings in the engine control assemblies. This facilitates the servicing of the controls and prolongs the length of time between periods when servicing becomes necessary. Loose clevis pins, loose throttle bushings, worn levers, poorly supported Bowden and Ahrens controls, bent or worn control rods and worn clevis ends should receive attention. All controls should be operated from the cockpit and observed by a second person on the ground for full operation. Condition of slack in a control unit can best be determined by setting the control half way open and feeling the control at the engine for looseness. Included in this inspection should



Rear and Side Views of Wasp C Engine Installation on Lockheed "Vega."

Assembly Stand as Shown at Right Permits Thorough Inspection of Engine Before Attachment to Plane.

be: throttle control, spark advance, altitude control, engine temperature control, controllable propeller control, carburetor air intake control, cabin and cockpit heater, shutter, fire extinguisher control, wobble pump, and any other control that affects the operation of the engine.

The largest portion of the electrical system of an airplane being in the ship itself, and not in the engine installation, this inspection must be completed when the remainder of the ship is inspected. However, the starter, generator, starting switches, head temperature guage elements, terminal boxes, and any other electrical equipment as may have been installed with the engine may be inspected. Especial attention should be given the condition of insulation, terminals, magneto switch, ground wires and terminals, radio shielding, and the starter should be operated to ascertain that it is functioning perfectly.

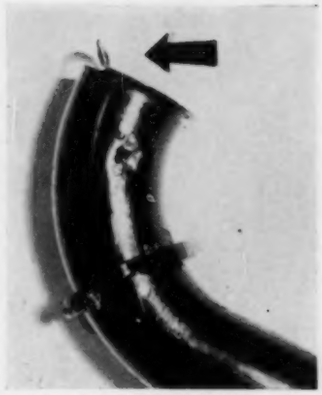
The inspection of a propeller is a study in itself. However, there are several points relating to the general inspection of a propeller that are interesting. Deep pits that have occurred in the blades are likely to be the source of a crack, and should be removed. It is essential that these pits be removed in such a manner that no sharp edges remain, since it has been definitely proven that it is from these sharp edges that propeller fractures emanate. Hub clamps should be inspected to see that they are against the shoulder of the hub, and that they are properly tightened and keyed. The surface of the hub should be examined for evidence of a fracture or distortion, and the propeller hub nut checked to determine that it is tight and safetied to the crankshaft.

Cowlings

Design of engine cowling and its various components has become so important because of its relation to the operating temperature of the engine, that there are several different types in use now. It would be impossible to discuss servicing of all these types here, but there are a number of useful facts that may be helpful. In order that cowling be maintained in good condition, it is essential that it fit the cowled portion perfectly. Cowling is usually made of comparatively light materials and any looseness that prevails is likely to result in a fracture of the cowling surface. Cowling clamps should be fastened firmly to the cowling and the entire cowling assembly examined for evidence of cracks, loose hinges, and excessive wear against support members. It might be well to note here, that a great deal of damage is done to cowling in handling it off the engine. This, of course, can all be eliminated if care is exercised in its removal and replacement. Most of the new cowling designs are equipped with some means of pressure baffling to facilitate the cooling of the engine. Examination of the entire baffling system of the engine is recommended. In some installations the cowling is quite close to parts of the fuel and oil system. It is well to ascertain that there is no possibility of these parts rubbing in flight, with the eventual development of a fracture of the fuel or oil line.

Miscellany

For a complete inspection of the engine, it is necessary that every part of the engine to which there is access without actual disassembly, be thoroughly checked. The oil screens should be removed and examined for foreign matter, cleaned and replaced. Incidentally, the contents of the oil screen are often a good indicator of the internal condition of the engine. If there is an oil sump drain on the engine, it should be removed and given a similar examination. These should be safetied as they are replaced. The spark plugs should be removed, adjusted, and tested under pressure to determine their actual dielectric strength. It is usual to replace only half of the plugs until the completion of the inspection in order that the propeller may be rotated with ease for the inspection of the valve mechanism. A good way to test the evenness of the compression is to screw an adapter into the spark plug hole of each cylinder, in order, inserting a pressure guage in the adapter.



Intake Manifold With Broken Flange. (Broken Portion Has Been Pulled Away From Pipe to Show Break)

The propeller may then be rotated and the condition of the piston and rings instantly determined. It is best to do this when the engine is warm. In some of the latest engines and a few of the older models, the push rod ends are lubricated externally by means of a pressure cup. In those engines that are not thus lubricated, the rods should be removed, cleaned, lubricated with a good grade of rocker arm grease, and replaced. On engines in which the rocker arms are drilled to lubricate the upper ends of the push rods by greasing the rocker arms, it is best to force grease through this passage with the push rod out, thus eliminating any foreign matter that may have collected in the passage. After the complete push rod assembly has been lubricated and inspected, and the housings replaced with new oil seals, the valve clearance may be checked. During this operation, the condition of the rocker arm roller, or tappet, as the case may be, may be investigated.

The rocker arm covers may next be replaced. The spark plugs may now be installed. The cylinder hold-down nuts should be tested for tightness, and the cylinders inspected for evidence of cracks. A loose cylinder head can often be discovered by close examination of the portion of the cylinder where the sleeve joins the head. Blistered paint and oil leakage at this point is often the result of a loose cylinder head. Primer injection fittings should be tight in their threads and the lines to these fittings in good condition. The various sections of the crankcases should be closely examined for cracks or looseness. Intake manifolds often crack

(Continued on Page 27)

WASHINGTON

P. T. NORTON, JR.

COMES the good word that legislation is now being introduced to aid and encourage civil aviation in the United States. The Bill S. 2991 recently introduced by Senator Sheppard and the corresponding Bill introduced in the House of Representatives by Congressman McSwain provide for government recognition and financial aid to civil aeronautics as a whole. Provision is also made for the Government to aid in the dissemination of aeronautical information by part tuition payments for student flyers. The Bill in substance is a commendable step in the right direction—a step greatly needed—well nigh essential at this time.

COMES the good word that civil aircraft engaged in miscellaneous flying operations flew 45,912 miles per accident during the last half of 1933 and 377,200 miles per fatal accident. The number of miles flown per passenger fatality was 499,667, and the number per pilot fatality was 477,376. An enviable record.

COMES the good word that more than 1,800,000 persons were carried as passengers in civil aircraft of the United States during 1933, according to an announcement of the Aeronautics Branch, Department of Commerce.

In all types of operations, including those scheduled air lines, miscellaneous commercial operators and private flyers, the number of passengers transported was 1,815,074. Miles flown totaled 125,865,390.

The passengers flown by civil aircraft during 1933 included 568,940 who were patrons of the air lines, and 1,246,134 who flew in other civil aircraft. The air lines flew 54,642,54 miles in 1933, and other civil aircraft flew 71, 222,845.

We now speculate as to the results in 1934. But it is evident that non-commercial civil aviation is coming into its own.

COMES the good word that a number of suggested *changes* in two proposed international aeronautical pacts have been decided upon by the United States members of the International Committee of Air Law Experts as a result of a meeting just held at the Department of Commerce in Washington. An effort to have these changes accepted by the full committee will be made by the American members before the treaties or agreements are adopted in final form.

One of the proposed pacts deals with the international air carrier's liability for damages resulting from collision between two aircraft. The second concerns the obligation of rendering assistance to persons on board aircraft in distress, and makes provision for indemnity to the rescuing aircraft or vessel.

The American members of the International Committee are: John C. Cooper, Jr., of Jacksonville, Fla.; Stephen D. Latchford, of the Treaty Division, Department of State; Fred D. Flagg, Jr., Director of the Air Law Institute of Northwestern University; and Richard S. Paulett, Chief of Enforcement Section, Aeronautics Branch, Department of Commerce.

This information is emphasized in view of the Southwest's proximity to the Republic of Mexico.

COMES the good word that student airmen, required by the Air Commerce Regulations to have 25 hours of solo flying for an amateur license, or 50 hours for the private grade of license, may acquire a part of this experience in flights during which they are accompanied by private, limited commercial, or transport pilots. Authority for this procedure is given by an amendment to the Air Commerce Regulations.

However, the student is required to accomplish 10 hours of actual solo flying before he can begin to take credit for time in the air while accompanied by licensed pilots. Also, such time may be claimed only when the student is the sole manipulator of the controls during the flight, including take-off and landing.

The amendment also introduces a requirement that the student make a thorough study of the Air Traffic Rules, and pass an oral examination on these rules given by his instructor, before making his first solo flight. The student and his instructor are made jointly responsible for the observance of this requirement.

Redefining solo time, the amendment states that "As used in these regulations, a person is engaged in solo flying when he is in command of aircraft in flight." Formerly it was necessary that the person taking credit for solo time in a flight should be the sole operator of the controls in addition to being in command of the aircraft.

COMES the good word that two radio-operated teletypewriter circuits between Washington and Baltimore are being set up by the Aeronautics Branch to determine the practicability of this method of communication for transmitting aeronautical weather data.

A committee appointed by Rex Martin, Assistant Director of Aeronautics in charge of air navigation, to study the possibilities of utilizing radio for the operation of the Nation-wide network of Department of

Commerce aeronautical teletypewriter circuits, decided to install two parallel radio circuits betewen Washington and Baltimore—one circuit to operate on 2,960 kilocycles and the other on 60 megacycles. Two transmitters, one for each circuit, will be located at the Washington airway radio station, and the two receivers will be installed at Logan Field, Baltimore.

These installations will be used to aid in developing equipment and to obtain test data prior to the establishment of longer experimental circuits between Washington and Newark, N. J.

If the committee finds that the teletypewriter machines on the Federal airways can be operated by radio, this will result in a substantial saving to the Government through the elimination of the leased land wires, of which there are now some 12,000 miles. These teletypewriter circuits are used for the dissemination of hourly weather reports along the airways and for the transmission of weather maps every four hours.

The committee undertaking the studies is composed of: Mr. Martin, chairman; Paul Goldsboro, president Aeronautical Radio, Inc., Washington; W. H. G. Finch, secretary and chief engineer American Radio News, New York; Eugene Sibley, chief communications section, and W. E. Jackson, chief development section, Aeronautics Branch, Department of Commerce.

COMES the good word that the Aeronautics Branch of the Department of Commerce will redouble its efforts in connection with the further development of radio as a means of accomplishing aircraft landings at fog-covered airports, and will conduct further experiments with lights to assist in the last part of blind landings, Rex Martin, Assistant Director of Aeronautics in charge of air navigation, announced following a conference on fog-landing problems held at the Commerce Department February 20, in which prominent scientists and aeronautical experts participated.

Based on existing fundamental knowledge of light penetration of fog, it was the consensus of opinion of scientists present that it would be impracticable to conduct further research on an attempt to find a light that would pierce fog and would register by any means on the retina of the eye. The use of such a light or light wave was declared by the physicists to be impossible of development at the present time. They agreed that radio seems to offer the quickest solution of the problem.

The net result of the conference was the elimination of certain ideas and the strengthening of others, as to the final solution of the problem. The Department of Commerce will continue to study the application of radio as a means of assisting in the accomplishing of blind landings, and also will experiment further with light as a visual means of accomplishing the last few feet of a landing under poor visibility. The translation of radio signals into a visual system for making blind landings also will be studied further.

COMES the good word that a device which visually interprets the signals of aeronautical radio range beacons which are received through headphones and are relied upon by airmen for directional guidance under conditions of poor visibility, has been developed by W. E. Jackson and L. M. Harding, radio engineers of the Aeronautics Branch, Department of Commerce. Announcement of the development by Rex Martin, Assistant Director of Aeronautics in charge of air navigation was recently made.

Mr. Martin explained: "The device includes an indicator which fits into the instrument panel. It is similar to that developed for use with the Department's experimental radio system for blind landings and can still be used for this purpose if desired. It has an open face with two needles, one vertical and the other horizontal. The vertical needle is the chief indicator. If the aircraft moves off the course defined by the radio beacon, this needle moves accordingly in the same direction. If the plane is exactly on the course, this pointer remains in the center of the dial. The horizontal indicator shows the volume of the received signals, which can be adjusted by the pilot.

"In addition to the indicating instrument there is a small converting set which is attached to the aircraft's regular radio receiver. This set fits into a small box 6 inches long by 7 inches wide and 7 inches deep. No changes are necessary in the regular receiving set.

"When the signals are received they are passed into the converting box and changed into impulses which actuate the visual instrument in front of the pilot. The signals may be received through the headphones simultaneously, thus giving visual or aural indication as the pilot desires.

"If the headphones are used, however, the pilot will hear a predominant dot or dash when off course, depending upon the direction, instead of the familiar Morse code A (. _) or N (_ .). It is necessary to change the character of the signals transmitted by the radio range beacons in order for the visual indicator to function. The airman would still hear a steady signal when on course.

"One of the chief advantages of the new device is that it requires only a slight and inexpensive change in cams at the radio range transmitters.

"The general problem of making radio range signals available to airmen in a visual form has been before the Department of Commerce for several years. One of the first solutions considered was that of installing visual type transmitters at radio range stations which would actuate two vibrating reeds on aircraft instrument panels. However, this method would have cost about $500,000 for the entire airways as against less than $500 for the system just developed.

"The arrangement developed by the two radio engineers has undergone extensive flight tests which have shown it to be satisfactory. However, no definite plans to place the new system in operation on the Federal Airways will be made until it has been given practical service tests by those airmen who fly the airways regularly and not then unless these expert users of the aids to air navigation signify their wishes for the new device."

Mr. Jackson and Mr. Harding have been working on the development of this arrangement for several months. Their efforts are worthy of high commendation.

COMES the good word that a maintenance control system which will place the operation of the Federal airways on a business basis and will give the Commerce Department a reliable check on the cost of airway maintenance operations and the efficiency of all equipment, is now being established in the Air Navigation Division of the Aeronautics Branch by Rex Martin, Assistant Director of Aeronautics.

Mr. Martin stated: "The lighted and radio-equipped airways have been stabilized to the point where such a system can now be set up and can be expected to give accurate

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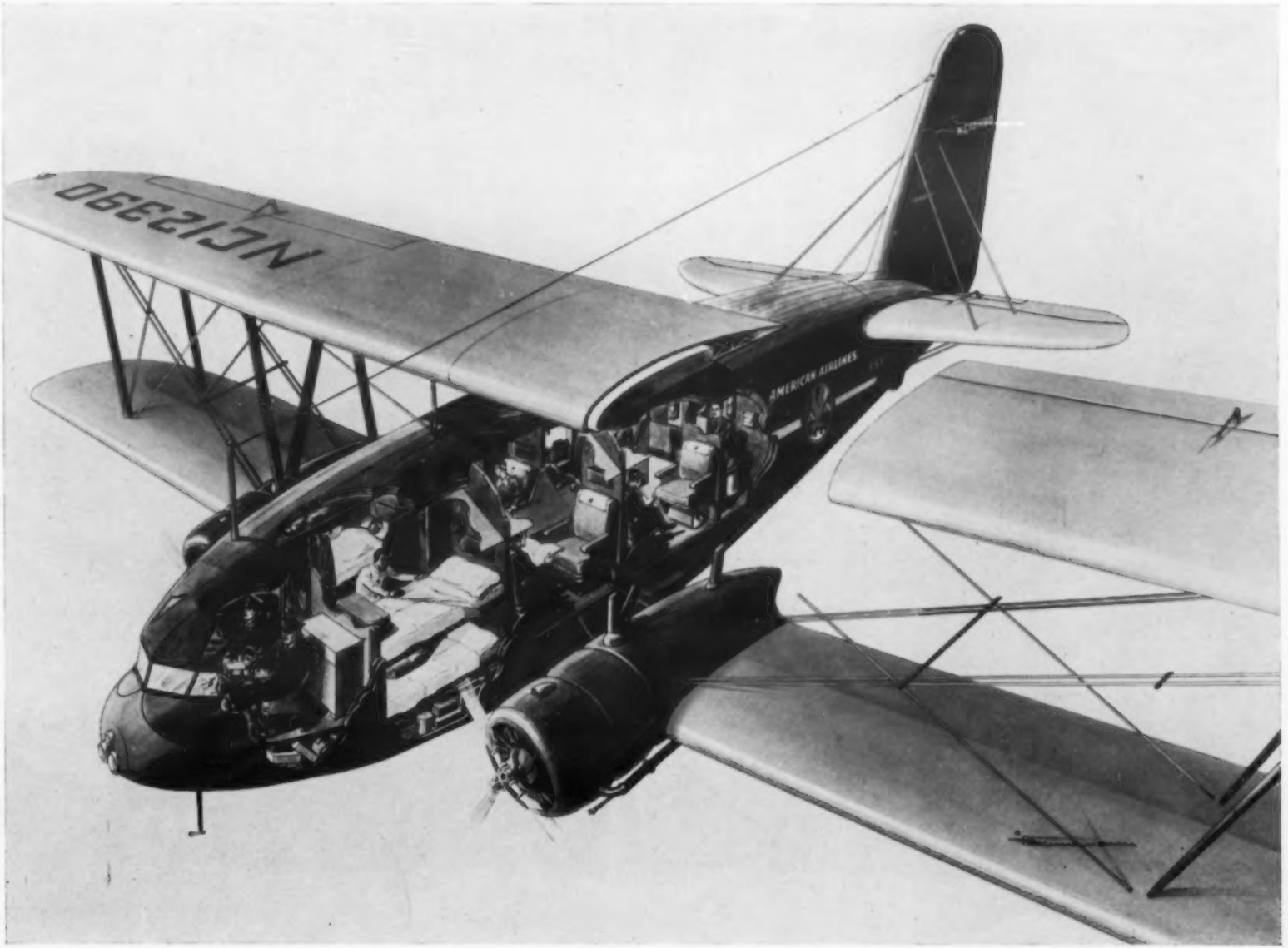

Sectional view of American Airlines' new Curtiss-Wright Condor transport plane showing complete accommodations afforded by the world's first flying sleeper. The six compartments, convertible in flight, provide seats and berths for twelve passengers. The plane is powered with two 715-horsepower Cyclone engines and has a cruising speed of 160 miles per hour. It carries a crew of three in addition to the passengers, express and baggage. For daytime use each passenger is provided with an individual window, reading light, service call button, warm or cool conditioner air control, ash tray and magazine rack. At night each compartment may be quickly converted to provide an upper and lower berth, reading light, service call button, air control, luggage shelf, clothing net and coat hanger. View also shows complete washrooms, commissary, from which complete meals may be served, and the control cabin equipped with two-way radio and all the latest equipment and instruments available which will add to the efficiency of operations and comfort of the passengers.

Why Build Models?

By R. J. BENNETT GEISTLE

Despite the alleged high level of "air-mindedness" among the American public, I hear many times this question, "What *can* you see in model building?" It is incomprehensible to most people that a man can derive so much pleasure from a little balsa, dope and cement. Jig-saw puzzles, yes, they are something that eevryone likes (and heaven forbid, there are people who compare models to jig-saws) but, generally speaking, a man who finds such pleasure in model planes receives that peculiarly condescending smile reserved for the village idiot; while little Willie is chased outside to play if he spends too much time with his toy airplanes.

Sowing the Seed

To begin with, models are neither toys nor jig-saw puzzles, but small planes which perform in practically every way as their prototypes, and which frequently manifest as many bugs as any tricky "X" job that ever came off the line; bugs which often cause the builder to wonder why he didn't stick to puzzles, but which also will furnish the aviation industry with many splendid designers and draftsmen when the present crop of young model builders has grown up.

I built my first model as a pleasant means of killing time—as an architect figuratively on the bread-line and some seventeen hundred miles from what I am pleased to call home—and have I found time an irksome thing and have continued to build them principally for the sheer joy of creating something with my hands, which places me in a category with a select few who may be marked down as a total loss with regards to any potentialities we may have had for the aviation industry. Fortunately, however, most boys, and they constitute the vast majority of model builders, care very little whether their models are scaled in every detail; they want a model that is built right and that will fly right.

Thrill in the Flight

Flight, then, is the principal reason for building models, and it is sufficient justification for spending many hours in building a model, even though that ship may be irreparably crashed on its first hop. There's a thrill in the flight of a model, to see the results of one's efforts taxi along the ground for a few inches, take off, and then climb gracefully into the air; a thrill which I believe is very hard to duplicate. And today that thrill is available to any one endowed with a small amount of patience and skill with his hands; because there are many kits available in which all the research, designing, and drafting have already been done; kits from which beautifully detailed flying models can be made by almost anyone.

Of course the construction of these models requires some experience in technique, and consequently the new modelist, especially if he be very young, should start off with building the simple stick models and gliders, gradually working up to the detailed scale models. And with this acquisition of technique comes also a knowledge of aircraft history, types and nomenclature that utterly shames the average pilot; the man of today who has a pilot's ticket can fly his ship, has a smattering knowledge of a few well known ships, and usually is content with that; but not so with these youngsters who will be designing and flying the ships of tomorrow—as has always been the paramount question with boys, they want to know "Why?" and with the questions settled they seek and gain all the available information on the aircraft of the world, their speed, general characteristics and their faults.

Room for Originality

The true model builder soon tires of building models from kits or drawings made by others, and starts building models from his own designs. And it is because of this trend that the aircraft of tomorrow will be not only economical and fast, but also safe, dependable, and for all practical purposes, fool-proof; for the model builder learns how to incorporate these features into his designs. Back in 1912 there were a few small groups of model builders, principally in the East, men such as Burnelli, Post, and Selley, the majority of whom developed into the designers of today—and likewise, from the legions of young model builders of today will develop scores of designers of the future, lads who will know from experience how to design planes which any normal person can fly fast, safely and cheaply.

There are available a number of excellent books on aerodynamics, in addition to several series of articles being conducted currently in the various model magazines, but a few normal boys have ever shown interest in mathematical equations and formulæ, they learn by doing—by building models and flying them, observing them in the air, and correcting their faults through experimentations. They learn what can cause a ship to stall, slip, spin, or any of the many other things that can and do happen to a model; and after many heart-breaking crashes, they learn how to design a plane that will do anything they might wish it to do. This knowledge, gained as it is through experiment, through trial and error, is not easily forgotten as is knowledge gained through the dull study of formulæ; in other words, they have a sensible and practical knowledge which will be of immeasurable value to the aviation industry and the public when these lads grow mature and become designers as a few of them have done and large numbers shall inevitably do in the future.

In the Years to Come

Thus, there is a wonderful future in view for the young model-builder of today, a future which will see a tremendous increase in air-travel, together with a marked decrease in headlines concerning fatal air crashes. These boys will be flyers, to be sure, but it is my opinion that the majority of them will choose designing as a profession; which will be a smart, if unconscious, move on their part—after all, there are at

(Continued on Page 24)

"Not Too Technical"

BY GEORGE CARROLL

STREAMLINED SECTIONS

George Carroll

"Streamlining" is not a word of modern coinage. It was not, as many think, invented in the advertising agencies of certain automobile manufacturers to promote sales. It is a word of scientific origin, long in use by aircraft designers and technicians—a word full of meaning and worthy of much consideration.

The development of aircraft is definitely segregated into two distinct stages, especially from a historical perspective of the subject in hand, namely, the streamlining of the various sections* that go into the composite form of all heavier-than-air craft. In the early stage of aviation's development, the builders worked toward the primary end of literally getting the product of their energies off the ground. Any machine that was capable of flight, automatically crowned its designer and builder with success. Only the rudimentary aerodynamic laws were obeyed in those first few years. For example, should any portion of an airplane be out of balance with another portion, loads would be shifted to overcome the discrepancy. Wires and struts, in fact all the planes' surfaces were of varying sizes and shapes, fabricated with little or no attention to lessening the parasitic and retarding elements which we of today caption as "drag."

Immediately preceeding the World War, the construction of aircraft passed out of the purely experimental stage. The fundamental aerodynamic laws had been proved; heavier-than-air craft *could* be made to fly. The realization came to all that the future of aviation depended upon (among other factors, but more especially) speed. Every manner and method of research was spent toward increasing speed through increasing aerodynamic efficiency. The major problem involved minimizing parasitic drag without jeopardizing any necessary elements of the craft. The fruits of these years, the second stage of development, are most evident to us at the present time. And although great progress has been made, the necessary consideration of streamlining and the problems involved are as apparent as ever before. Today the quest for greater speeds necessitates a knowledge of proper streamlining, and with this knowledge, our modern aircraft designers strike at one of the fundamental roots of the desired result.

Let us consider a few simple examples of streamlined sections in order to more clearly appreciate the importance of the subject.

Figure 1 demonstrates the physical fact that any object moving through air meets with a certain amount of resistance. Here, a flat plate is being forced through the air at a sufficient speed to produce resistance to a notable degree. If air currents were visible the action of the air particles about the plate would appear as shown in the figure. It is evident that the manner in which the air "curls" up behind the plate and the pressure develops against the frontal section. The "whirlpools", or vortices, behind the plate, definitely retard the speed of the moving object.

In Figure 2 a round object that passes through the air develops considerably less resistance than the flat plate. The rounded or "leading" edge of the section shows the marked tendency to force the air apart, but at the same time the vortices still attend, and build up a partial vacuum behind the object, and while being forced back into its normal condition by atmospheric pressure, an actual resistance is exerted.

Illustrated in Figure 3 is a streamlined section so designed as to force the air to flow even more smoothly around the body's surfaces. The vortices are eliminated, thus reducing the parasitic drag so noticable in the foregoing figures. At this point it is necessary to mention that for every speed range, the cross section will vary in width and depth according to the designated speed the body is to travel. Proper streamlining has to do with the proper fixing of the ratio between width and depth. As the speed range is increased, it is evident the section must be more highly streamlined. The ratio of the streamline in Figure 3 is about 4:1, and may be used arbitrarily to represent the structures of a body designed to pass through the air at about 100 miles per hour.

Figure 4 represents the section of a body designed to pass through the air (for our purposes) at about 300 miles per hour and exhibits a 6:1 streamline ratio.

*The diagrams herein contained are applicable to all surfaces on a plane, excepting the airfoils, or wings, which will be taken up in a subsequent discussion.

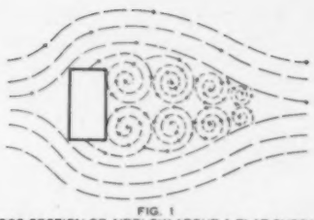

FIG. 1
CROSS SECTION OF AIRFLOW ABOUT A FLAT SURFACE

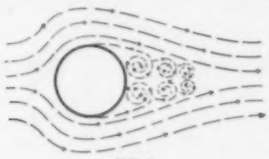

FIG. 2
AIRFLOW ABOUT A PERFECT CIRCLE

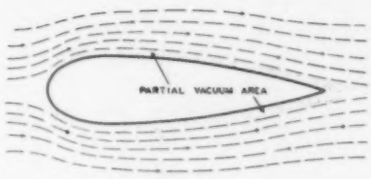

FIG. 3
AIRFLOW ABOUT A 4:1 STREAMLINE

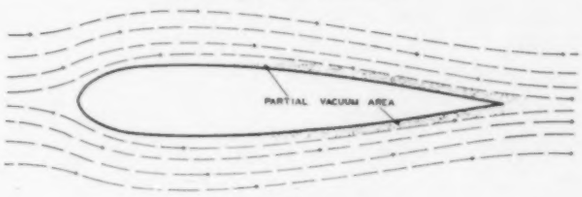

FIG. 4
AIRFLOW ABOUT A 6:1 STREAMLINE

It is streamlined in accordance with the speed it is to travel. If the structure in Figure 3 was made to travel at the speed we designated for the object shown in Fgure 4, the effect of the vortices behind the body would approximate the air currents illustrated in Figure 2. In other words, the "trailing" edge would not extend far enough behind the "leading" edge to produce proper airflow about the structure. The vortices, reduced pressure and partial vacuum which are evident in Figure 2 would result in this transposition. Consequently we understand that in either high or low speeds, if the body moves faster than its design calls for or permits, drag of the parasitic brand, sets in.

The importance of streamlining cannot be overemphasized in our approach to the various ramifications of aircraft design. For with each pound of parasitic resistance that can be eliminated, several pounds of "extra" weight can be added with no loss of or change in performance. It is interesting to note that airplanes in the 2000 pound weight class have been and are being constructed in which is produced no more parasitic drag than would be produced by a small plate of three square feet in area. It is also well to remember that "fancy" lines in aircraft are not always synonomous with aerodynamic efficiency even though such craft may be advertised as being "highly" streamlined.

With these facts in mind, it is not difficult to realize how important and how fundamental streamlining efficiency really is, not only from the standpoint of increasing speeds, but at the same time permitting the carraige of useful or profitable weight.

Wheels Up

BY HALL HIBBARD

Chief Engineer, Lockheed Aircraft Corp.

What happens when a pilot lands an airplane with "wheels up"? With the growing use of retractable landing gears on modern, high-speed transport airplanes, this question is being asked more and more by air travelers.

The answer is, "Very little." Take, for example, the single-engine Lockheed Orion, the first air liner to employ completely retractable gears. On numerous occasions, Orions have been landed with wheels pulled up entirely into the wing. Bottoms of fuselages and wings have been scratched somewhat, but in no case has a "wheels up" landing of an Orion resulted in injury to persons.

Because of the low center of gravity of a low-wing monoplane and the high cushioning effect of the wing, the plane merely skids along the ground for 150 to 250 feet after landing, and stops. There is no tendency to "nose over." In snow, in water or on rough ground, the bottom of the fuselage and wing serves landing purposes much better than wheels. It is much more hazardous to land on water or rough ground with wheels down than to land anywhere with the gear retracted.

While the gear and wheels of the Lockheed Orion are completely faired into the wing when retracted, the gear of the new low-wing, bimotor Lockheed Electra retracts in such a manner that the lower surface of the airwheels always protrudes slightly below the wing to serve as a "roller" in case a landing is made with wheels up.

Wind tunnel tests show that there is only a negligible increase in drag when a small portion of the tire is exposed to the airstream. The tire prevents the ground from scratching the bottom of the fuselage, and the brakes may be applied in the customary manner.

Pilots whose routes carry them over particularly rough terrain prefer to fly airplanes equipped with retractable gears. Where wheels might drop into a rut or hit a rock and nose a plane over, the bottom of a fuselage and wing form a large "skid" and permits safe landings to be made where they might otherwise prove hazardous.

From Yesterday's Mail

Excerpts from Letters

UNITED STATES SENATE
Committee on Military Affairs
April 20, 1934

Mr. P. T. Norton, Jr.
Associate Editor, *Southwestern* AVIATION
The Park Lane
Washington, D. C.

Dear Mr. Norton:

I congratulate you on the first issue of *Southwestern* AVIATION.

The attractive make-up of this publication and the thorough-going manner in which it deals with the entire subject of aviation make it a service of immense benefit to the cause of air navigation.

I wish for this journal the widespread and increasing success it so eminently deserves.

Truly your friend,

(Signed) Morris Sheppard.

+ + +

"We thank you very much for sending us a copy of your first edition, and you are certainly to be complimented on the splendid manner in which *Southwestern* AVIATION was prepared and we wish it every success."—B. D. DEWEESE, Vice President and General Manager, Stinson Aircraft Corporation, Wayne, Michigan.

+ + +

". . . We have received your first edition copy of *Southwestern* AVIATION and believe its issuance will serve a very worthy and meritorious purpose in the South and Southwestern section."—C. D. DAVENPORT, Assistant General Manager Mobile Chamber of Commerce, Mobile, Alabama.

+ + +

". . . We wish to express our sincere wishes for your success. You are serving a live field, and if you serve it well, your publication should grow to be one of the outstanding aeronautical journals in the country."—R. R. IRWIN, Lockheed Aircraft Corporation.

+ + +

". . . Must say that I thoroughly enjoyed the first issue of your new aviation magazine, and want to congratulate you on such a good paper and wish for you a continued success. I do not want to be without your magazine, so please put my name on the mailing list for a year and send me the bill."—CLINT BREEDLOVE, Manager Municipal Airport, Lubbock, Texas.

"Headwinds"

Southwestern AVIATION
Fort Worth, Texas
Gentlemen:

I ran into a copy of your magazine and read the interesting column titled Headwinds. I hope you don't mean wind in the head, but whatever it is, here's something I've had held up a long time.

We have all heard much about the "New Deal" for Aviation. What I want to know is for some one to tell me just what the new deal is? As yet I have been unable to find out anything except the *reasons* for a new deal, and I have known them for a long time, and the Lord knows and all of us know who have been in the game for a long time, that there are enough faults in the system to have a new shufflle, a new banker, and a straight dealer.

At the present time this is a percentage game—the soup line getting the percentage of the boys that have spent some of the best years of their lives learning and boosting aviation, hoping that some day there would be a pot of gold at the end of the rainbow.

All the aviation mags have made a lot of to-do over the recent housecleaning. But about all they have done is a lot of howling and hollering. With all their experience why don't they give some real constructive suggestions as to working out the problems?

I hope you get off on the right foot down there.—C. D. B., Wichita, Kansas.

+ + +

A Transport Pilot Writes His Congressman

(The letter printed herewith was addressed to this column with the author's permission for publication. It was written by a transport pilot and was prompted by a letter appearing in this column last month.—Editor's Note.)

Hon. Fritz G. Lanham, Congressman

House of Representatives,
Washington, D. C.
Dear Mr. Lanham:

I hope, Sir, that you will kindly tolerate this letter to the finish because I feel that it is timely, due to our present condition in both commercial and military aviation. As I have had several years of diversified experience as a professional pilot in all phases of commercial aviation, I can speak with some authority on some of its present conditions.

I am sending this to you with the idea in mind that if it has no value it will be disregarded, and be considered only as an honest effort to aid in some small way, aviation and the eight thousand unorganized transport pilots of the United States who are not represented in Washington.

These eight thousand professional transport pilots feel that the New Deal is a Godsend to them, and realize that any action the Government might take in regard to aviation will greatly affect them. Out of this group of men there is a large number who are as qualified to give any kind of advice about aviation—both

military and commercial—as anyone in these United States, due to their constant relationship to both. These men are not international heroes, but are broad-minded and 100 per cent for our President and his Administration.

As has come to light in the past two months, both military and commercial aviation have needed a complete reorganization for some time. We in the profession have realized this for a long time. A composite of ideas from those who have been with aviation before and since its growth will do more to help reorganize it on a fair and sound basis than will any other method. After all, the pilots are the men who have suffered with it in its infancy, kept it before the public, and brought it where it is today. These men know it from the ground up.

There are about 600 commercial pilots that are represented in Washington (The Airline Pilots Association). These men have in no way helped or attempted to aid the commercial transport pilots. The Airline Pilots Association has been closed to pilots who are not flying on scheduled air lines—yet some of these pilots are more experienced than the members of the Airline Pilots Association. As an illustration: The pilot flying for a private owner, whose ship is not equipped with all the late type of instruments as the air liners are, must fly the owner anywhere at any time. He does not enjoy the opportunity of always flying over the same routes and established lighted airways, but is forced to fly over strange country under unfavorable weather conditions at times, where every mile ahead is a mystery to him. You will find he always brings his ship home safely, through fog and rain.

One of the things I hope that this letter will do, is to make clear the fact that the military phase and the Airline Pilots Association are well represented in Washington; but that over seven thousand transport pilots are in dire need of aid and are too poor to be represented. They should not be forgotten in any changes that will affect the flyers in commercial aviation. I am sure that the Government will find that these seven thousand unorganized men can, and will, if called on, supply the Government with valuable information toward reorganizing aviation for national defense and for safer commercial aviation.

There is one other thing which we wonder about, but do not quite understand. That is the Army's method of training their flyers, which method has hurt commercial aviation by closing our flying schools and by forcing flyers into commercial aviation, which field is already crowded.

Here is how it looks to most of us: The Army takes a number of flying cadets in each year and discharges a number of Reserve Officers each year. The average length of active service for the officer is two years, including his cadet period. He will average about 400 to 500 flying hours in that time. He is then thrown on the commercial market, where he finds there is no market for flyers with 500 hours' experience. Also he finds after being around commercial aviation awhile, that he knows no more about commercial aviation than the commercial flyer knows about military aviation. Generally, he will go into other fields and wean himself away from aviation, concentrating his efforts on work which will make him a living. The Army offers him only two weeks training a year to keep up or fit, providing the funds are available for reserve training. If they are available, after two or three years that man is no longer considered even a fair pilot on account of the elapsed time between flights. A pilot is not seasoned until he has had a thousand or more hours of diversified flying, and even then if he did not stay with flying, a comeback after two or three years would be difficult. This is the case where the Army flyer knows nothing about commercial flying and the commercial flyer knows nothing about military flying. But by the Army training flyers they have closed one of the means of support for the commercial flyers—the commercial flying schools.

It would seem that if there was an attempt to thoroughly train the flyers we have today in A-1 shape in all phases of flying, in and out of the Army, it would be much better. In other words, if we had 12,000 of the best trained flyers that it was humanly possible to produce (by co-operative training between commercial and military aviation) it would seem more safe from a national defense standpoint than thousands of untrained and stale flyers who will be produced under the present method of training.

I trust that I have made myself clear in the above letter, and assure you that any interest you might take in the betterment of conditions for transport pilots will be appreciated not only by the undersigned, but by thousands of other pilots.

Respectfully yours,

(*Signed*) CHARLES C. CURRY
Transport Pilot and Reserve
Army Air Corps Officer

WACO AIRPLANES
"Ask Any Pilot"

Edward F. Booth, Inc.

Distributor

HANGAR 1 LOVE FIELD, DALLAS

Ports of Call

Aerial View of New Orleans' Shushan Airport—Widely Acclaimed as the World's Finest Air Terminal.

Austin, Texas

VERNON RAMSEY from San Antonio was over in his new Kinner the other day to demonstrate it to a few likely prospects. Ramsey and his Hangar Six Inc. have taken the distributorship for the Kinner. Everybody that got a chance to fly it was quite enthusiastic about the ship and those who did not get to fly the ship, liked its looks.

DON MCDONELL, instructor in one ship, and WEBB RUFF in another went out bandit hunting a few days ago. Clyde Barrow and associates were reported having a picnic (perhaps it was a Navajo) or a race down the highway a short distance from Austin. The local Police chartered the two ships and went out spying. Nothing interesting was sighted and nobody was caught. Don's luck is still with him. He went fishing recently where "they bite as soon as you drop the hook in". Fished all night and with a rather morning-after-the-night-before look on his face the next morning announced that he didn't even get a nibble.

BOOTS STEWART expects to have his Waco Model F up and about in a few days. He has been recovering the ship and overhauling the motor in preparation for a trip to somewhere. Honduras has been mentioned. Perhaps he is merely getting ready for the Summer rush.

HERMAN NEWMAN, the Dutch mechanic is no longer in Austin. He has gone to Nicaragua with CARL HUGHES to keep a Wasp powered Super Universal percolating on all nine. Herman was well known and had friends all over the Southwest.

LAURA RISSMAN, Austin's good natural flying secretary says she can still make her landings in bunches. Laura has taken up horseback riding seriously lately. Every time she comes out to the airport she is astride a mighty steed. She does real well as a horsewoman, too.

Beaumont, Texas

The Beaumont Municipal Airport has enjoyed a marked increase in activity with the arrival of a Taylor Cub purchased by MISS LOIS NEEL and WILEY SULLIVAN.

RALPH HALL, with his Travelair, and LUTHER CARUTHERS, with his Curtiss Robin have made several very successful barnstorming trips to Kirbyville, Jasper, DeRidder, DeQuincy and several other towns in this vicinity, and had as their advance man, ANDY GIRSON, who does nicely with the work.

Among the new students at the field are: HERBERT PEAVY, L. A. WASNICK, E. A. WEST, JOE GREGG, LOIS NEEL, IRMA ELIZABETH CLARK, EARL DORROW, GEORGE FECEL, "DUB" TAYLOR, BOB TESCHE, NOLAN PREJEAN and LESTER HANKAMER.

A Corbin Baby Ace, built by BOB TESCHE of Port Arthur, was successfully test hopped by FRANK ESTILL. It is owned by NOLAN PREJEAN and is now hangared at Beaumont.

R. Z. GLASS, Rio Theatre owner here makes frequent trips from Dallas to Beaumont in his Monocoupe.

"SNAP ROLL", a new figure at the airport in the form of a turtle has become quite chummy in that he has learned to smoke. Someone of the brighter minds which light up our airport, conceived the brilliant idea of offering Snap Roll a cigarette. Turtle like, he snapped at the chance. Believe it or not, he smoked it calmly and almost to the end, and then knocked the ashes off with his claws and discarded the cigarette. Snap Roll apparently suffered no ill effects.

A South American airline has claimed another Beaumont pilot. FLOYD ADDISON, now flying a Monocoupe for Servicio Aereo Colombiano, is based at Bogota, Columbio. Other Wing Over Club members now flying in South America are IKE GORDON and GENE GRAY.

MRS. HELEN R. JOHNSON, Wing Over Club mem-

ber, has taken over the Palestine Airport, and has a Fairchild, Stinson and a training ship.

Plans for a spot landing contest, to be sponsored by the Wing Over Club, are well under way. On the committee are RALPH HALL, LUTHER CARUTHERS and FRANK ESTILL. These contests prove to be very popular in Beaumont and this one should be a huge success.

Recent visitors to the Wing Over Club have been: JACK DEMPSEY, here on a personal appearance tour. B. H. GRIFFIN, co-pilot with Mattern on an attempted flight around the world. LEO CLONEY, Wedell-Williams pilot. MAJOR D. J. YOUNG, Pure Oil Co. FRANK FAULKNER, flying the Pure Oil Autogyro.

Campeche, Mex.

When any sort of celebration takes place in Mexico, few stones are left unturned to afford color and ceremony. The new Pan-American Airways terminal building at the airport in the Mexican city was formally dedicated recently in a program headed by His Excellency Ramero Esquizal, Governor of the State of Campeche. Since the celebration coincided with the Constitution Day holiday, a public fiesta was proclaimed. Flags were unfurled, military bands furnished music, boxing matches, drills, and football games were a part of the ceremonies.

Chanute, Kan.

GLEN MCCONNELL has purchased a Barling from BOB GRAY of Pittsburgh and has kept it up in the air most of the time since the purchase.

W. P. HOUSTON of the Crawford Theaters Company, which owns a local theater, was a recent visitor on a business trip. He came in with his Stinson.

RAY BARKER of Youngstown, Ohio, is in Chanute visiting relatives. He tells many interesting stories of his two years of flying around the Great Lakes.

O. E. DICKERHOOF, Airport Manager, reports good business during the past month. He recently made delivery of a Monocoupe to NORMAN KRAMER of Syracuse. The Monocoupe was completely rebuilt and overhauled at the Chanute Airport by Dickerhoof.

Lack of funds have temporarily delayed the CWA airport improvement work. New appropriations will be available within a few days and construction will be resumed. An extension of the apron is under way, and a fill is being made in the Northeast corner of the field. The drainage system has already been installed. When the entire job is finished, the entire 160 acres of ground will be available for use.

GEORGE BAGLEY is having his OX Robin rebuilt and will have it ready to fly within a few weeks. ALBERT PAYTON is having his Laird Sport rebuilt. Both jobs are being turned out at the airport.

FRANK REYNOLDS, who was recently laid off by American Airways, has taken a job with Beechcraft.

MR. SLINGERLAND of Altamont is proud of his new purchase—a Kari Keen which he hangars at Chanute.

JACK WOOD of Topeka, who recently bought an Aeronca for training purposes, reports an excellent student business.

Dallas, Texas

Cy Bittner, ranking pilot of American Airways on the Cleveland-Albany route, paid a ten-day visit with friends on Love Field. Bittner has many friends in this section of the country, having made them in the old days of the Gates Flying Circus.

Announcement comes that Lou Foote has absorbed the interest of Van Cleave in the former Lou Foote-Van Cleave Aircraft Co., and is now sole operator of the entire company. The aircraft department is under Ray West, licensed aircraft builder and repair man, the engine work under the personal supervision of Lou Foote, who is a licensed A. & E. mechanic. Student instruction is given personally by Foote, the primary flying stage in a Waco, and the advanced flying in a J5 Travelair Special.

Traffic on all the air lines serving Dallas has been exceptionally heavy of late. The departure and embarking of scores of passengers on the Bowen, American Airways, and United planes cinches Dallas as one of the leading air terminals in the Southwest. Express, too, at this port is steadily increasing. Private flying and commercial hops also add to the busy atmosphere of activity on Love Field.

"Doc" Booth is making history selling Wacos. Seven since the first of the year, isn't it Doc?

Enid, Okla.

Noncommercial private flying in this Oklahoma town is steadily increasing. Six privately owned and two commercial planes make up the local airplane population.

The Municipal Airport has undergone extensive CWA improvement. The east-west and north-south runways have been extended 800 feet. Plans include the construction of a 3,000-foot northeast-southwest runway, which is nearing completion. These improvements to the field have definitely encouraged flying in Enid.

Fort Worth, Texas

A great deal of interest is being displayed in Nick Greener's and Reg Robbins' new speed job, which is nearing completion. The fuselage is ready for covering, all farings are completed, and the controls installed. The Hisso engine is ready for installation. The plywood speed wings which are to go on the plane were purchased from Jimmy Wedell and promise to give the final touch to a well-constructed and graceful racing job.

Jess Bristow sold his Ryan J6 and purchased two J5 Standards. Both Standards are five-place jobs with room for four passengers in the front cockpit and the pilot in the rear.

Craton Guthrie finally found a job and is back at Meacham Field buying flying time with the new salary. He hopes to have his transport sometime during the Summer months.

Henry Woods, Ed Ritchie, and the Fort Worth School of Aviation, of which Bud Emerson is owner, are all enjoying an increase in commercial and instruction business. Reg Robbins has recently returned from a successful barnstorming trip into West Texas.

was one of the few municipally owned and operated airports in the entire State, and at that time was recognized to be one of the finest airports along the Gulf Coast.

To keep pace with the development of aviation, the City of Mobile applied to the Civil Works Administration for the approval of a project involving approximately $200,000. This project included grading and draining the field; the construction of a new administration building and the construction of a new hangar, also the cost of lighting and landscaping. This project was approved and the work immediately launched with CWA labor, and at the time of the demobilization order issued from Washington the work was approximately 50% completed. Recently the city has been assured by the administration authorities in Washington that the work would be completed under the Federal Emergency Relief Administration and that work would soon be resumed at the Field.

Construction of Commodious Hangar on Bates Field, Mobile's Municipal Airport. In the Right Background Is the New Administration Building.

In the grading and draining operations at the Field, it was necessary to remove approximately 3,600 large stumps and approximately 72,000 cubic yards of dirt were excavated. The Field was continously dragged during the course of operations and this portion of the project has been practically completed.

Prior to the launching of this project, the equipment at the Field consisted of a small frame structure utilized as an administration building and a very small corrugated metal hangar with accomodations for three planes of small wing spread. These buildings are being replaced by brick and steel structures respectively. The brick side walls to the administration building have been started but are not yet completed. The steel in the hangar is practically all fabricated and erected, and part of the sheet metal roof is on. Approximately all of the concrete floors and runways have been poured.

In the lighting of the Field, it was decided that all of the overhead wiring in the vicinity of the Field should be placed underground, and this operation was begun immediately and has been completed. Seventy-five per cent of the underground cable for the lighting system has been laid and some of the flood lights have been put in place, and it will only require a very short time to complete this work, as boundary lights have been distributed around the Field and only a short time will be needed to connect them. This particular portion of the project represents an expenditure of approximately $55,000. Heretofore the Airport had no boundary markers and it was thought that by bordering the Field with shrubbery, such a plan would aid in late afternoon and early evening flying, and approximately 2,000 shrubs were hauled from a nearby nursery and set around the Field. Other landscaping operations at the Field consist of the planting of shrubbery around the new administration building and on the greensward bordering the runways.

In the words of aviation authorities recently visiting this city for an inspection of the airport, Mobile has "one of the finest airports in the entire South, and because of its easy access to the city should prove a boon to commercial aviation travel and development." Bates Field is only eight minutes from the heart of Mobile and is located on one of the leading paved highways of the County. The Field consists of approximately 196 acres and the space for landing is laid off roughly in the shape of a right triangle, with the base running north and south, and the hypotenuse in a northeast-southwesterly direction. The North-South runway is 2,300 feet long, and the East-West runway is approximately 1,750 feet long. The prevailing winds are from the north in the winter and south in the summer. There are no obstructions in the approaches to the Field. Prior to cancellation of air mail contracts, Mobile was served by the American Airways New York to New Orleans Air Line, and that Company continues to operate its passenger planes over this line. Departure to the Southwest is scheduled in the morning, and departure for the North and East is scheduled in the afternoon. At present, there are two interesting groups negotiating for lease privileges at the Field for operation of an air school and mechanical service. Also at the present, Mobile is being considered as one of the termini for a new line to embrace all cities of any size dotting the eastern half of the Gulf Coast.

Oklahoma City, Okla.

The Aviation Club, organized in January at the capital city, has grown from its original twenty charter members to a membership of well over seventy-five. which is made up of aviation devotees directly and indirectly connected with flying. The primary purpose of the new club is to stimulate and promote a healthy growth of aeronautics in Oklahoma. It was felt before organization that only through the concerted efforts of all those involved or interested in aviation could this purpose be accomplished.

The club meets semi-monthly. Every other Friday at noon a luncheon is held and a good program of entertainment is given in addition to the regular business meetings. Attendance at these meetings, a good indication of success, averages well over 80 per cent.

Plans are being laid for a mass flight of planes to make an inspection tour of the forty-four recently completed CWA airports in Oklahoma. June 12 has been set as the date and forty planes carrying eighty

Hot Springs, Ark.

The Municipal Airport has just recently undergone extensive improvements, the work having been done as a CWA project under the direction of Charles M. Taylor, Arkansas State Superintendent of Airports.

The most important improvement has been the extension of the runways which permit the large ambulance planes to bring patients to the local Army and Navy General Hospital.

Kansas City

Fairfax Airport in Kansas City, Kansas, returned to the control of W. S. "BILL" GREEN as manager recently, under some shifts of personnel and management. Green was the manager there in the days of real activity, and started things moving again, despite rather quiescent days in aviation.

First, a little competition on spot landing, etc., was staged under the sponsorship of the Propellor Club. This club was organized with DR. J. D. BROCK, Kansas City's daily flyer, as president, and J. LAUREN FREEMAN as secretary. It has been stimulating interest generally in private flying.

Next, under an arrangement whereby the municipality took charge of the airport as its own, Mr. Green arranged to have the run-ways all put into first-class condition. The Government is providing the work under the unemployment relief program.

While the runways are being torn up and made over, flying is rather impractical off of Fairfax, except for kites. So kites it is. A city-wide contest in which all boys are eligible, this event being under the auspices of the Kansas City Kansan, local daily, is scheduled for a Saturday. More than 2,000 entrants are expected.

K. A. KENNEDY, Chicago general traffic manager of United Air Lines, was scheduled as the speaker before the Chamber of Commerce at Kansas City, Mo., on the weekly luncheon program devoted to air transportation.

MISS LOUISE THADEN, a noted aviatrix who has made her home in Kansas City, is being discussed as a possible entrant in the air race from London to Melbourne, Australia, next summer. Her Kansas City friends are looking about to try to find the necessary financial backing.

The Chamber of Commerce was active in the movement to prevail upon the Post Office Department to restore airmail to commercial contractors. Several communications relative to Kansas City's ideas on this question were sent to Washington. The loss of the airmail service was a real injury to Kansas City business generally. Now that the Government has restored the system of airmail carrying by private operators, Kansas City feels that the line to Denver, omitted from the original set-up of proposed lines, should be included again in the national system, according to the views expressed by the Chamber of Commerce.

ROY "LEFTY" FARRELL, manager of the Kansas City Municipal Airport, has done a tremendous job of lining up airport work under the Government's CWA program. He was head of the state division on airport construction. Despite the withdrawal of CWA funds, much was accomplished, and will be accomplished under further federal programs.

Laredo, Texas

A year's work of improvement and development has just ended. During this time the entire airport was practically rebuilt from the hanger to the runways. Mechanic services and fuel are now available day and night.

Civic interest is exerting every effort to have Laredo designated as an international port of entry. At the present time plans are before the Aeronautics Branch of the Department of Commerce to put in proper facilities for night lighting.

Lubbock, Texas

The flying spirit is being substantially renewed in West Texas, both in student flying and cross country visitors. Repair business, a good indicator, is on the boom.

At the present time, a spot landing contest is under way and interest is being exhibited from the youngest fledglings to the experienced transports. The Texas Company representative, MR. W. B. PRICE, who is now one of the new City Commissioners, is sponsoring the contest, and has donated an attractive silver cup to be awarded to the winner. The contest is to be held every Sunday afternoon, the winner for each contest to have his name engraved on the cup. Permanent possession goes to the pilot than wins any three of the contests.

Spring activity in the West Texas and New Mexico oil fields has definitely stimulated air travel in these parts. Many of the old customers in the oil business are coming back through again along with the new ones.

W. J. RUMBACK of Littlefield has his Spartan at the airport for a complete cover job, and a top overhaul on the Siemens. All work is being done by CLINT BREEDLOVE.

MR. E. E. HENDRICKS is preparing to go up for his transport ticket at the next visit of the Department of Commerce Inspector.

MR. A. F. HOLT must be getting the racing fever. He plans to have his Travelair fully recovered, and is contemplating the installation of a Tank motor. It is rumored on the field that this work is being done to get away from the Bull Pup and the solo students, who crowd around him during his pleasure flights around the field.

In the near future, Lubbock hopes to have a couple of training planes in the air most of the time, for inquiries from interested students keep coming in, both from the new students, and the former students who had to give up their training on account of hard times.

Mobile, Ala.

The interest of municipal and commercial enterprise in the establishment of facilities for airmen in this vicinity has been admirably reflected in the development of Bates Field—Mobile, Alabama's air field. Bates Field, originally constructed a few years ago,

fliers and passengers are scheduled to make the five-day trip. Burrell Tibbs is chairman of the flight committee and "Pop" Johnson is the able vice chairman.

Shreveport, La.

Ever since the air mail was taken over by the Air Corps, both the officer and enlisted personnel at Barksdale Field has decreased by a continual draft for mail duty. Departures to the various bases of mail operations have been a daily occurrence. With the absence of so great a number from the post, the burden of daily routine duty has been shifted to the few remaining, who have been carrying on.

News about the "mailmen" drifts in occasionally. We hear from Dallas, Texas, that "Cupid" seems to have been the best incentive for cause of news, or maybe the boys' uniforms needed a few buttons, but anyway LT. "MICKEY" MOORE and LT. "DOC" STROTHER are now numbered among the married. "Congratulations." CAPT. E. V. HARBECK paid an impromptu visit to this field recently while en route to San Antonio for a conference with the depot engineering officer, CAPT. RALPH WALKER, in regard to engineering problems in connection with Central Zone mail operations. CAPTAIN HARBECK has been on duty at Chicago, where he is zone engineering inspector. LT. MERLIN I. CARTER, who is flying on the Dallas, Texas, to Kansas City, Mo., mail route, has developed a "hot." Just ask him to deliver the mail to the postoffice, but be ready to take off when you question. For the secret, ask LT. J. P. MCCONNELL for the details. LT. T. BAXTER, who is assistant control officer at Omaha, Neb., has been spending a few days here. He reports that all the "gang" from Barksdale are doing fine, especially LT. H. C. GIBNER. LT. H. K. MOONEY has been reassigned to the St. Paul Base from Chicago. LT. D. N. MOTHERWELL is now supply officer at Omaha, Neb. And LTS. D. MITCHELL and L. KUNISH report from Barksdale, that they are up and around, and there is no further cause for anyone to worry, unless they should again become afflicted with car disease.

Although the post seems somewhat inactive with so many among the missing, this loss is made up by the noise of the new projects under construction. When the men return from mail duty, they will picture a different Barksdale Field.

Tulsa, Okla.

Spring activity in all phases of aeronautics far surpasses anything in the past three years. The "Oil City" petroleum companies' planes are getting more time than usual.

Spartan Aircraft reports substantial increase in both student enrollments and work in their approved repair station.

Johnny Armstrong, manager of the Tulsa Commercial Airport, also reports renewed activity and an increase in business on his field.

Waco, Texas

CWA improvements account for the extra 40 acres recently added to the Waco Airport. The two runways have been extended to a total length of 3600 feet. Rolling has been completed, and the entire field is now available for landings. New boundary lights and day markers are also a welcome result of the recent improvements.

Spring activity is better than in the past several years. Especially on the week-end days is the renewed activity and interest most evident. Barnstormers returning to the airport unanimously report good business over the State. Herb Green made a voyage to Gatesville and carried scores of people about in his Challenger Robin.

Dick Young, instructor at the Airport, soloed three students during April.

Dees McDermott, who holds the lease of the airport, was a regular patron of Arlington Downs during the Spring racing meet. He flew back and forth from Waco in his Stinson.

Among the overhauls and repairs to some of the craft on the field is the OX Travelair of Arthur Henges. The re-covering job is being done in the N. T. A. C. shops at Arlington.

John Barnes and Jack Newland have returned from Detroit with Barnes' shining, new, and altogether attractive Stinson Reliant.

From Washington

(Continued from Page 13)

results. In past years when the airways were being constructed and equipment and men were being moved hurriedly from one point to another, a maintenance control system would have been difficult to maintain.

"The value of the system to the Government has already been demonstrated, although it is not yet in full operation. As a first step, a detailed inventory was taken of all Federal Airways equipment. This showed that at the present time there is nearly $2,000,000 worth of surplus equipment on hand. Some of this is obsolete but there is enough usable material available to reduce expenditures for new supplies for the next two years by about 75 per cent of what would normally be required. Practically all construction materials for new airways projects now under way are being supplied from surplus stock.

"Further, the system provides for salvaging each part of equipment that can possibly be reclaimed. When a part becomes worn, it is carefully examined and repaired if at all practicable.

"Not only does the system make for more efficiency at present, but it provides a basis for estimating future requirements and, further, it brings about economy without a decrease in efficiency."

The maintenance control system is in partial operation at the following Airways District Headquarters and is supervised by the Washington Office of the Aeronautics Branch: Newark, N. J.; Atlanta; Chicago; *Fort Worth;* Salt Lake City and Oakland, Calif.

Why Build Models

(Continued from Page 15)

present more transport pilots working in automobile assembly plants and other industries than in flying. Model builders of the past have developed into designers of today—Boeing has several ex-model builders on their staff, and that company enjoys an enviable reputation the world over; just a few weeks past a young model builder of Buffalo, Floyd Kowalak, won the Popular Aviation contest with his model of a Boeing 247, and in doing so won also the offer of a job from Major Fleet of Consolidated Aircraft Corporation—model builders now will be the designers of the aircraft in which we will all be flying in future years. And thanks to them, the air will be a more expedient and safer, though crowded, means of travel.

CLASSIFIED

Rates: Five cents per word; minimum$ 1.00

FOR SALE

Warner Cessna, newly re-covered. In A-1 condition. Total hours, 450. $1100 cash. Care Box 1280. Southwestern Aviation.

Travelair OX-5. Perfect condition. 50 hours since major overhaul of engine and plane. Re-covered, licensed, never cracked. Box 423, Southwestern Aviation.

Fully re-covered 1931 Lycoming Stinson with new leather upholstering. Only 35 hours since major overhaul. $1750 cash. Box 428, Southwestern Aviation.

Curtiss C-6 Travelair. Recently overhauled. Sacrifice at $650. H. E. Hing, Meacham Field, Fort Worth, Texas.

OX-5 Robin. Excellent condition. Motor turns 1400 on ground. Newly covered, Dec. 1933. Bargain at $500. Box 1281, Southwestern Aviation.

Model A Waco, 170 Jacobs Engine, $2500. Model F Waco, B-5 Engine, $1800. Both in excellent condition. Box 437, Southwestern Aviation.

Parts: 125 gallon gasoline tank with dump valve and 40 feet hose; 1 American Eagle fuselage and empenage; swallow wing, left lower; upper left Travelair wing; right lower and upper American Eagle wing. Box 439, Southwestern Aviation.

Sale or trade: Spartan J6-7, Waco Siemens, OXX, Cardinal Leblond, Stinson J6-5, Franklin Veile, Pitcarn J-5. Box 419, Southwestern Aviation.

Millerized OX Robin, licensed until Dec. 1934. New covering, excellent condition, $500. Box 1283, Southwestern Aviation.

For sale, new licensed Cavaliers, America's finest two-place cabin monoplane. Used and new planes. Star Aircraft Co., Bartlesville, Okalhoma.

WANTED

WANTED: Good used airplanes. We have prospects for practically all types of ships. Two sold during April. Free storage until sold. Ships stored in fireproof hangar.

LOU FOOTE FLYING SERVICE
Love Field, Dallas, Texas

Good used Wasp J-5, J-6 Warner and Kinner. Must be in good shape. Box 1272, Southwestern Aviation.

Complete Warner or parts, any condition. Supply division, Lambert Field, St. Louis, Mo.

Wanted to lease or rent a good plane to use in taking time. Responsible party with several hundred hours. Quote prices, terms and all information about plane. Box 1276, Southwestern Aviation.

SWAP COLUMN

Will trade Aeronca with 150 hours for Waco F or Fleet. Box 1273, Southwestern Aviation.

OX Standard, needs re-covering, for what have you? Box 1282, Southwestern Aviation.

Will trade a 1933 Ford V8 Coach for good licensed plane. Car like new and in perfect condition. Joplin Air Service, Joplin, Mo.

POSITIONS WANTED

Position as Airport Manager desired by experienced man. Will go anywhere. Salary and references discussed on first communication. Fred Napoleone, Sante Fe, New Mexico.

SERVICES RENDERED

Expert repair work on all types of planes at lowest prices consistent with best grade workmanship and materials. Approved repair station, Aircraft Mechanics, Inc., Colorado Springs, Colorado.

NEWS BRIEFS

THE INDUSTRY AT LARGE

Stinson Sales Increase Over Southwest

With many deliveries already made, and other orders to be filled, Stinson Aircraft Corporation of Wayne, Michigan is enjoying a good sale of the new 1934 Stinson Reliant over the entire Southwest. Among the more recent deliveries were those to A. B. Alkek of the Sinclair Refining Company, Victoria, Texas; James Brazell, President of Western Airways, Inc., Oklahoma City; Byrd-Frost, Inc., of Dallas; R. W. Vierson of Okmulgee, Oklahoma; J. F. Barnes of the Barnes Lumber Company, Waco; Dean Gill of Oklahoma City; and Robert S. LeSage of the LeSage Motor Company at Graham, Texas. These sales of the Reliant point to a growing popularity of the "Transport" type of cabin airplane in the Southwestern territory.

J. B. (Jack) STORY

District Sales Manager for Stinson, with Headquarters in Oklahoma City, and the New 1934 "Reliant" Showing "Speed Arresters" in Landing Position.

Oklahoma City is the base-town for Stinson's sales organization in the Southwest. John B. Story of Oklahoma City is the factory representative and has just recently taken up his duties there.

Dobie in Germany

Americans will soon be flying between Berlin and Paris in two and one-half hours, or from London to Berlin in three hours, thanks to airplanes built in the United States, for Luft Hansa, largest German line, has just taken delivery of the first of a fleet of three-mile-a-minute Boeing multimotored transports similar to those United Air Lines flies between Chicago, Fort Worth and Dallas and over other routes, M. A. Hagberg, traffic representative, announced.

Dick Dobie, who pilots planes through Fort Worth for United, arrived in Germany last month to give instructions to German pilots on the flying of the high speed equipment.

These Boeings are fifty miles an hour faster than the average speed of passenger transports now being flown in Europe. The sale marked the first delivery ever made in Europe of high speed equipment manufactured in the United States.

Kellett Acquires Banners

The Kellett Autogiro Corporation of Philadelphia, Pa., has recently acquired an exclusive license for the use of the Bleriot sky banner patents in the United States and Canada. These patents cover the release of a furled banner while in flight as well as the banners themselves, and are pooled with Kellett's patents and patents pending. Licenses are being issued for their use throughout the United States and Canada by the Kellett Corporation.

According to R. G. Kellett, aerial advertising must be built on high-grade, sound advertising lines if the big national advertisers are to be interested and if it is to outlast the "novelty period"; that advertisers of this type are not often interested in local sky banner work whereas it would be most acceptable if somebody could offer national coverages, often in many localities simultaneously. It is Kellett's aim to form a group of licensees who will solicit and execute local work in their respective territories and be in a position to handle those parts of national contracts which are to be executed in their territory but which they as a single, independent operator would not be in a position to get or execute. The license agreement covers not only the use of the patents but catalogs, information and sales guidance in the conduct of aerial advertising.

Noted Pilot Goes With Waco

John Livingston, famous racing pilot, recently became associated with the Waco Aircraft Company as engineering test pilot in charge of production test flying.

Livingston will conduct the engineering test flying and will supervise the testing of planes as they come off the production line before being delivered to customers.

Livingston will be remembered as winning the trophy at the National Air Races for two consecutive years, as the outstanding pilot of the meets. He also won the Ford Reliability Tour two years in succession, bringing fame to himself and to the Waco product.

For nine years, Livingston distributed Waco planes over the United States. During the last two years he has spent most of his time in racing and adding speed to planes without changing structural designs.

South Texas Grapefruit

An experimental air express shipment passed through Fort Worth in April, aboard a United Air Lines plane, en route from Dallas to New York. Six cases of specially grown grapefruit, raised on a border ranch owned by Pilot Marion Sterling of United's Chicago-New York route, were shipped air express to New York to fill an order for extra fancy fruit. The fruit was picked in South Texas in the morning and was in New York the next day.

Westport Radios

Late model Westport aircraft radio receivers are being installed in nine airplanes of the Aeronautics Branch, Department of Commerce. Five of the planes to be equipped with Westport radios are new Kinner cabin monoplanes being built for the Department by Kinner Airplane and Motor Corporation, Glendale, Calif.

Phillips Plane to Aerovias Centrales

Los Angeles-Mexico City service of Aerovias Centrales, affiliate of Pan-American Airways, was opened late in April with Lockheed Orions, upon delivery of the air line's new bimotor Lockheed Electra.

To augment its flying equipment, Aerovias Centrales purchased an Orion from the Phillips Petroleum Company, Bartlesville, Oklahoma. The Orion, which has complete navigation equipment including a Westport radio, was completely overhauled recently at the Lockheed factory.

Within 60 days, the line expects to put into service the first of its six new Wasp-powered all-metal Lockheed Electras.

Welding Institute At Boeing School

During nine months ground school instruction at the Boeing School of Aeronautics, Oakland, California, a total of 288 hours of metal instruction is given, and the first half of this time, taken over a six months period, is devoted almost entirely to welding practice, according to T. Lee Jr., general manager of the aeronautical school. Students electing to become metal workers divide the final half of the course between welding and work with light alloys, with some attention being paid to aluminum welding.

Early welding instruction is entirely with the torch, with a direct-current arc welder being used for advanced work. In addition to the shop practice, a lecture course in metallurgy is given, together with lectures on precautions and safety practices in welding, care and maintenance of equipment, choice of torch and size of tips.

Instruction is also given in shrinkage and warp of the work, and allowance for the same. The practice is carefully guided to insure the gradual development of the student. From time to time, specimens of the student's work are required and graded by the instructor. Welds are cross-sectioned and etched at frequent intervals, and a 20,000-pound tensile testing machine is used to test specimens.

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Inspection of Aircraft

(Continued from Page 11)

at the flange connection to the cylinder, or develop leaks from loose rivets, poor packing rubbers or loose packing nuts. The condition of the flange of an intake pipe may be determined by tapping the pipe lightly. A dull sound usually indicates a broken flange, while a comparatively live sound indicates that the pipe is in good condition, so far as the flange is concerned. Condition of the exhaust stack connections, gaskets, tension on exhaust stack nuts, and general condition of the collector ring should be noted. Cabin heat and cockpit heat collector pipes should be removed and examined for conditions of burning or rusting.

Carburetor nuts should be felt to ascertain correct tension, and carburetor braces examined. The main carburetor screen, economizer jet wells, float chamber drains and other carburetor screens should be removed, cleaned and replaced. After replacement, the gasoline should be allowed to flow into the carburetor with the valve left on for some time to be certain that all gaskets are tightly sealed. Positive operation of the various levers of the carburetor should be determined by noting their operation while the trottle is moved in the cockpit. Carburetor outside air intake pipes should be securely supported and intact throughout their length. Magneto couplings are usually lubricated by a felt wick inside the coupling. This wick can be oiled and the coupling moved to determine the amount of slack that has developed between the coupling and its drive gear. The coupling lock-ring should be in place and the drive gear properly keyed to the drive shaft. The breaker point assembly can next be removed and the points examined for pits or roughness. Magneto points give very little trouble between overhauls but the following suggestions regarding their care are made: If any roughness at all is discovered, it may be removed by using a piece of fine sandpaper between the points. The felt wick for oiling the cam should be oiled and the points operated by hand to determine the condition of the lever arm fulcrum. If the points show a tendency to stick they may be freed by removing the fulcrum and cleaning it with a piece of fine sandpaper. Care should be taken that this pin is properly safetied after screwing into the breaker assembly. The condition of the magneto bearings may be determined to some extent by feeling the cam with the breaker assembly removed. Unless the bearings are in a frozen or bad condition, the cam will rotate freely until the slack in the coupling is taken up. The magneto should be lubricated periodically in accordance with the manufacturer's specifications. Ingition wires that pass close to exhaust manifolds, cylinder heads or any object that might rub them should be checked to ascertain the condition of the insulation. Spark plug terminals in radio-shielded assemblies should be tight enough to assure a good ground for the shielding. Temperature indicator connections often leak oil unless they are drawn up very tight. The oil pressure line, supercharger pressure guage connection, and lines connecting the engine vacuum pumps with various instruments and tachometer drive shaft are all of major importance. They should be well supported and attached to their respective places.

Ground Test

After the engine is completely checked, the next operation is the ground test. The engine should be started, and run rather slowly until the oil is warm enough to circulate freely. When the desired temperature of the oil outlet from the engine is obtained, the engine may be run at full throttle (unless the throttle has a stop past which ground operation is not permitted) and the operation observed by means of the various engine instruments. The oil pressure, fuel pressure, revolutions per minute, drop in revolutions from one magneto to the other, supercharger pressure, and the general operation of the engine should be closely noted. If a plug is out on one cylinder, it will be instantly apparent by an excessive drop in revolutions when the motor is run on the magneto that supplies that plug. After the test at full throttle a close inspection of the engine (if it was clean to begin with) will show any oil leaks that may have developed. After the repair of any defect that may have developed, the cowling may be installed and the engine inspection is complete.

Next Month: Part II, Inspection of Fuselage and Empennage.

AVIATORS
HEADQUARTERS
IN FORT WORTH

Our many Flying friends select The Blackstone as their own home in Fort Worth—because The Blackstone has always served them to the best of its ability—whether it be delicious food—well-kept, comfortable rooms—or those tactful little services that a well-trained organization can render. Also for the fall and winter seasons The Blackstone has engaged some splendid dance orchestras to play for luncheon and dinner daily, and the regular dances.

The
BLACKSTONE
Fort Worth's Hotel of Distinction

Under the Hood

(Continued from Page 6)

before I was sure I was not to meet the "laundry board". However all through the school I felt as if it was to my discredit that I could not bring a ship in out of the fog.

Prior to and after my experience in the fog, we had many arguments among the cadets as to whether or not an aviator could be able to maintain his balance in the fog, or at least be able to tell what position he was in. Some maintained that one's senses could surely tell you whether the ship were climbing, diving, or turning. Others argued against it because they had read or heard that when in the fog there is no sense of balance to be relied upon. I knew that I could not fly straight and level through the fog for any length of time, but whether it was because I was deficient in some sense peculiar to successful aviators or whether no one could, I did not know.

A few days before graduating from Brooks Field we were given a demonstration by being whirled around in a chair while bending over looking into a box containing a compass and bank and turn indicator. I noted in this that one's turning sensations did not agree with the instruments; however, no explanation of the fact or of the demonstration was given.

I decided the best thing to do would be to stay out of the fog, that if one did get into it the bank and turn and pitch indicator might bring you out, but as they didn't agree with one's senses they were not a "sure thing."

After graduating from Kelly Field I reported to Crissey Field for active duty. I found that here there was a real interest in the art of blind flying. From Captain David A. Myers I heard the first authoritative explanation of what happens to one's senses when flying blind. A demonstration with the "black box" proved that one's senses when flying blind cannot at all times be relied upon; that it will seem you are turning one way when the instrument shows you are turning in the opposite direction or have stopped.

I was advised that when flying blind, as I would eventually have to do while at Crissy Field, to disregard my senses and fly by the "Artificial Horizon." That is easy to say but hard to do. I often practice flying blind by ducking my head in the cockpit and flying by the instruments. It is easy on the straight and level but once the plane gets to "doing things" and your instruments say your left wing is down, you are skidding and turning to the left—while all the while you know very well you are flying straight and level—then it is hard to disregard what your senses tell you and mechanically bring the ship back straight and level according to the instruments.

In my practice of blind flying I have found that when the instruments go "all fluey" the following mechanical procedure is the best to bring the ship back straight and level. However, other ways work just as well.

(1) Bring the ball back to center with the rudder. This corrects slipping or skidding.
(2) Stop the turning with stick and rudder according to the turn indicator.
(3) Lower or raise the nose according to the pitch indicator and air speed meter.

(Signed) GEO. W. HANSEN, 2nd Lieut., A. C.

DAY AFTER DAY
SUMMER AND WINTER

The stations of the Southwest Broadcasting Company and its associated stations cover thoroughly, ninety per cent of the nearly six million population of Texas, Oklahoma, Eastern New Mexico, Arkansas, and Southwestern Louisiana . . . In Texas alone, four million dollars spendable yearly income. . . . Nearly three million dollars spendable yearly income in and around Oklahoma City, representing one and one-eighth per cent of the total population of the United States. Place your advertising appropriation where it will reach the largest number of potential customers for your business.

KFDM	KRLD
KNOW	KLRA
KXYZ	KTAT
KTRH	KTSA
WRR	KOMA
KGKO	WACO

SOUTHWEST NETWORK

its

A WILD GOOSE CHASE

WHEN YOU DO NOT GO TO SOUTHWESTERN AVIATION FIRST TO LEARN THE LATEST IN AERONAUTICAL ACTIVITY IN THE SOUTH AND SOUTHWEST.

Circulation Manager,
Southwestern Aviation,
Ledger Bldg.,
Forth Worth, Texas.

I am enclosing $2.00 for one year's subscription to Southwestern AVIATION *to be sent to the following address:*

Name.....

Address.....

City.....State.....